United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Kansas Agricultural Experiment Station

Soil Survey of Nemaha County, Kansas

How To Use This Soil Survey

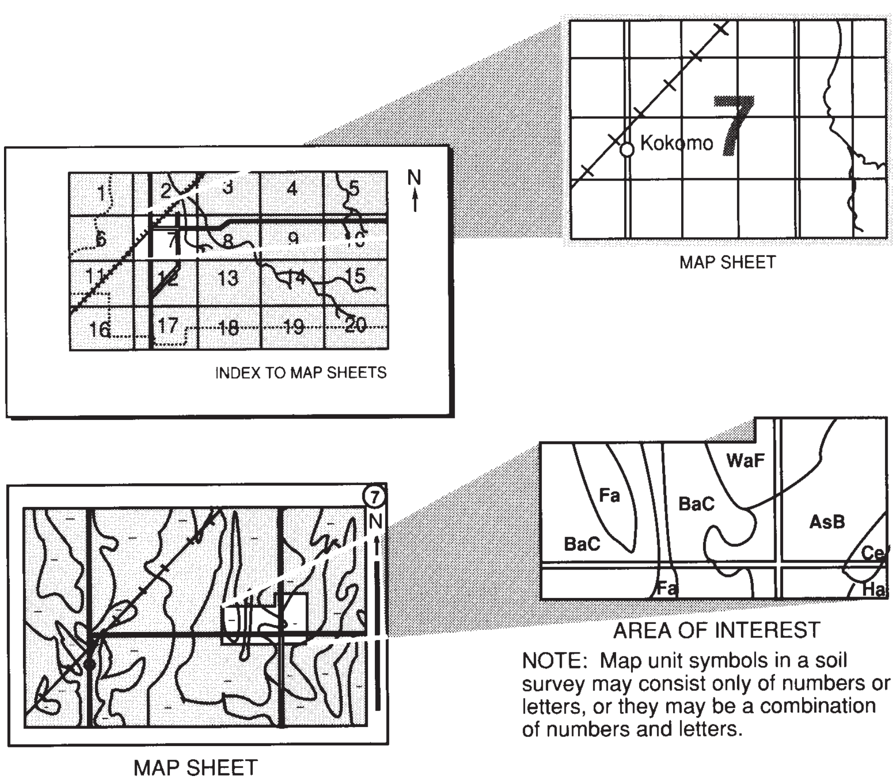
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2003. Soil names and descriptions were approved in 2004. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2003. This survey was made cooperatively by the Natural Resources Conservation Service and the Kansas Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Nemaha County Conservation District.

Cover: A profile depicting a Pony Express rider. This profile is located on Highway 36 east of Seneca in Nemaha County, Kansas.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Issued 2005

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Harold L. Klaege
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Soil Survey of
Nemaha County, Kansas

By Pat Abel, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Kansas Agricultural Experiment Station

General Nature of the County

NEMAHA COUNTY is in the northeastern part of Kansas (fig. 1). It is bordered on the north by Nebraska, on the south by Jackson and Pottawatomie Counties, on the west by Marshall County, and on the east by Brown County. It has a total land area of 460,474 acres, or about 720 square miles. In 2000, the population of the county was 10,717. Seneca, the county seat, in the south-central part of the county, had a population of 2,122. The county was organized in 1865.

Nemaha County is in the Nebraska and Kansas Loess-Drift Hills major land resource area. The soils generally are deep and gently sloping to moderately steep and have a clayey or loamy subsoil. Elevation ranges from 1,023 to 1,420 feet above sea level.

Most of the county is drained by the Nemaha and Black Vermillion Rivers and Spring Creek, all of which are permanently flowing streams. The Nemaha River flows north, the Black Vermillion River west, and Spring Creek east.

The main enterprises in the county are farming, dairying, and swine producing. Sorghum, corn, soybeans, and wheat are the main crops.

This soil survey updates the survey of Nemaha County, Kansas, published in 1982 (USDA, 1982). It provides additional information and has larger maps, which show the soils in greater detail.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Centralia in the period 1971 to 2000. Table 2 shows probable dates of the

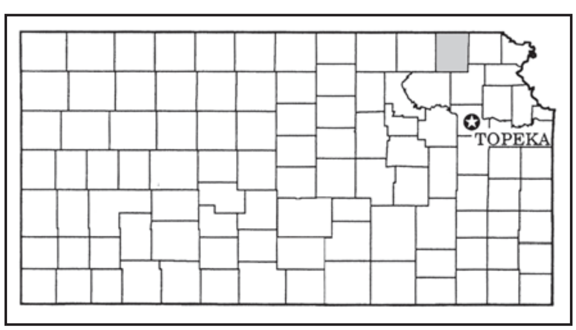

Figure 1.—Location of Nemaha County in Kansas.

first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 29.4 degrees F and the average daily minimum temperature is 19.4 degrees. The lowest temperature on record, which occurred at Centralia on January 14, 1947, is -35 degrees. In summer, the average temperature is 75.8 degrees and the average daily maximum temperature is 87.3 degrees. The highest recorded temperature, which occurred at Centralia on August 13, 1936, is 114 degrees.

The total annual precipitation is 35.21 inches. Of this, about 24.9 inches, or 71 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 8.54 inches at Woodlawn on May 20, 1977.

The average annual snowfall is 34.6 inches. On an average, 24 days per year have at least 1 inch of snow on the ground. The greatest snowfall on record was 63.2 inches, during the winter of 1978-79.

The sun shines 76 percent of the time possible in summer and 63 percent in winter. The prevailing wind is from the south. Average windspeed is highest, around 13 miles per hour, in April.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic

classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Wamego silt loam, 3 to 7 percent slopes, is a phase of the Wamego series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Kipson-Sogn complex, 5 to 30 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Gravel pits and quarries is an example.

In the descriptions, “LEP” means linear extensibility percent.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

4020—Chase silty clay loam, occasionally flooded

Map Unit Composition

Chase: 90 percent
Minor components: 10 percent

Component Descriptions

Chase

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty and clayey alluvium
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: High (about 10.0 inches)
Shrink-swell potential: Very high (about 9.2 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: About 24 to 48 inches
Surface runoff class: Low
Ecological site: Loamy Lowland (pe30-37)
Land capability (nonirrigated): 2w

Typical Profile:
Ap—0 to 8 inches; silty clay loam
A—8 to 17 inches; silty clay loam
Bt—17 to 37 inches; silty clay
BC—37 to 42 inches; silty clay loam
C—42 to 60 inches; silty clay loam

Minor Components

Kennebec
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

4525—Benfield silty clay loam, 3 to 7 percent slopes

Map Unit Composition

Benfield: 90 percent
Minor components: 10 percent

Component Descriptions

Benfield

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Clayey residuum derived from calcareous shale
Slope: 3 to 7 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 6.3 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
Bt1—6 to 19 inches; silty clay, gravelly silty clay
Bt2—19 to 37 inches; silty clay, gravelly silty clay
Cr—37 to 41 inches; weathered bedrock

Minor Components

Kipson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 25 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Limy Upland (pe30-37)

Rock outcrop
Extent: About 5 percent of the unit

4590—Clime-Sogn complex, 3 to 20 percent slopes

Map Unit Composition

Clime: 50 percent
Sogn: 35 percent
Minor components: 15 percent

Component Descriptions

Clime

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Silty and clayey residuum derived from calcareous shale

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Low (about 4.7 inches)
Shrink-swell potential: High (about 8.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very high
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 9 inches; silty clay
Bw—9 to 22 inches; silty clay
C—22 to 35 inches; silty clay
Cr—35 to 39 inches; unweathered bedrock

Sogn

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Loamy residuum derived from limestone
Slope: 5 to 15 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very low (about 2.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Shallow Limy (pe30-37)
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 12 inches; silty clay loam
R—12 to 16 inches; unweathered bedrock

Minor Components

Martin
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 8 percent
Drainage class: Moderately well drained
Ecological site: Loamy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 7 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Rock outcrop
Extent: About 5 percent of the unit
Slope: 20 to 40 percent

4710—Kipson silty clay loam, 5 to 30 percent slopes

Map Unit Composition

Kipson: 85 percent
Minor components: 15 percent

Component Descriptions

Kipson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Silty residuum derived from shale, calcareous
Slope: 5 to 25 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Low (about 3.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 9 inches; silty clay loam
C—9 to 19 inches; gravelly silty clay loam
Cr—19 to 23 inches; weathered bedrock

Minor Components

Benfield
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Steinauer
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 25 percent

Drainage class: Well drained
Ecological site: Limy Upland (pe30-37)

4725—Kipson-Sogn complex, 5 to 30 percent slopes

Map Unit Composition

Kipson: 60 percent
Sogn: 30 percent
Minor components: 10 percent

Component Descriptions

Kipson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Silty residuum derived from shale, calcareous
Slope: 5 to 30 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high (About 0.60 inch per hour)
Available water capacity: Low (About 3.5 inches)
Shrink-swell potential: Moderate (About 4.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 8 inches; silty clay loam
C—8 to 19 inches; silty clay loam
Cr—19 to 22 inches; weathered bedrock

Sogn

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Loamy residuum derived from limestone
Slope: 5 to 20 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high (About 0.60 inch per hour)
Available water capacity: Very low (About 2.6 inches)
Shrink-swell potential: Moderate (About 4.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Shallow Limy (pe30-37)
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 12 inches; silty clay loam
R—12 to 16 inches; unweathered bedrock

Minor Components

Kennebec
Extent: About 10 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

4830—Wamego silt loam, 3 to 7 percent slopes

Map Unit Composition

Wamego: 85 percent
Minor components: 15 percent

Component Descriptions

Wamego

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Sandy and silty residuum derived from shale
Slope: 3 to 7 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Low (about 5.0 inches)
Shrink-swell potential: High (about 6.6 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Loamy Upland (pe30-36)
Land capability (nonirrigated): 4e

Typical Profile:
A—0 to 6 inches; silt loam
AB—6 to 10 inches; silty clay loam
Bt—10 to 27 inches; silty clay loam
Cr—27 to 31 inches; weathered bedrock

Minor Components

Elmont
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 7 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Wymore
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 7 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

4831—Wamego silt loam, 7 to 20 percent slopes

Map Unit Composition

Wamego: 85 percent
Minor components: 15 percent

Component Descriptions

Wamego

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Sandy and silty residuum derived from shale
Slope: 7 to 20 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately low (About 0.06 inch per hour)
Available water capacity: Low (About 5.0 inches)
Shrink-swell potential: High (About 6.6 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Loamy Upland (pe30-36)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; silt loam
AB—6 to 10 inches; silty clay loam
Bt—10 to 27 inches; silty clay loam
Cr—27 to 31 inches; weathered bedrock

Minor Components

Clime
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 20 to 40 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Limy Upland (pe30-36)

Elmont
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 7 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)

Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Sogn
Extent: About 4 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 20 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Limy (pe30-36)

Rock outcrop
Extent: About 1 percent of the unit

7010—Calco silty clay loam, frequently flooded

Map Unit Composition

Calco: 90 percent
Minor components: 10 percent

Component Descriptions

Calco

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Calcareous fine-silty alluvium
Slope: 0 to 1 percent
Drainage class: Poorly drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: High (about 11.7 inches)
Shrink-swell potential: Moderate (about 4.7 LEP)
Flooding hazard: Frequent
Depth to seasonal zone of saturation: About 0 to 36 inches
Surface runoff class: Negligible
Ecological site: Loamy Lowland
Land capability (nonirrigated): 5w

Typical Profile:
A—0 to 17 inches; silty clay loam
C—17 to 60 inches; silty clay loam

Minor Components

Kennebec
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

7050—Kennebec silt loam, occasionally flooded

Map Unit Composition

Kennebec: 96 percent
Minor components: 4 percent

Component Descriptions

Kennebec

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very high (about 12.6 inches)
Shrink-swell potential: Moderate (about 3.9 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: About 40 to 44 inches
Surface runoff class: Low
Ecological site: Loamy Lowland (pe30-37)
Land capability (nonirrigated): 2w

Typical Profile:
Ap—0 to 10 inches; silt loam
A—10 to 36 inches; silt loam
AC—36 to 48 inches; silt loam
C—48 to 60 inches; silt loam

Minor Components

Wabash
Extent: About 4 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 1 percent
Drainage class: Poorly drained
Ecological site: Clay lowland (pe30-37)

7051—Kennebec silt loam, frequently flooded

Map Unit Composition

Kennebec: 90 percent
Minor components: 10 percent

Component Descriptions

Kennebec

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very high (about 13.0 inches)
Shrink-swell potential: Moderate (about 3.5 LEP)
Flooding hazard: Frequent
Depth to seasonal zone of saturation: About 36 to 60 inches
Surface runoff class: Low
Ecological site: Loamy Lowland (pe30-37)
Land capability (nonirrigated): 5w

Typical Profile:
A1—0 to 8 inches; silt loam
A2—8 to 30 inches; silt loam
AC—30 to 41 inches; silt loam
C—41 to 60 inches; silty clay loam

Minor Components

Kipson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 25 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Limy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7090—Wabash silty clay loam, occasionally flooded

Map Unit Composition

Wabash: 91 percent
Minor components: 9 percent

Component Descriptions

Wabash

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Drainage class: Poorly drained
Slowest saturated hydraulic conductivity: Very low (about 0.01 inch per hour)
Available water capacity: Moderate (about 7.5 inches)
Shrink-swell potential: Very high (about 10.4 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: About 2 to 9 inches
Surface runoff class: Medium
Ecological site: Clay Lowland (pe30-37)
Land capability (nonirrigated): 3w

Typical Profile:
Ap—0 to 6 inches; silty clay loam
A—6 to 16 inches; silty clay loam
Bg—16 to 52 inches; silty clay
Cg—52 to 70 inches; silty clay

Minor Components

Kennebec
Extent: About 3 percent of the unit
Landform: Flood plains in river valleys

Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

Leanna
Extent: About 3 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clay Lowland (pe35-42)

Reading
Extent: About 3 percent of the unit
Landform: Terraces in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Loamy Lowland (pe35-42)

7170—Reading silt loam, rarely flooded

Map Unit Composition

Reading: 90 percent
Minor components: 10 percent

Component Descriptions

Reading

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Terraces in river valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 11.5 inches)
Shrink-swell potential: Moderate (about 5.4 LEP)
Flooding hazard: Rare
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Lowland (pe35-42)
Land capability (nonirrigated): 1

Typical Profile:
Ap—0 to 10 inches; silt loam
A—10 to 15 inches; silty clay loam
Bt—15 to 35 inches; silty clay loam
BC—35 to 41 inches; silty clay loam
C—41 to 60 inches; silty clay

Minor Components

Chase
Extent: About 5 percent of the unit
Landform: Terraces in river valleys
Slope: 0 to 2 percent

Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland (pe35-42)

Wabash
Extent: About 5 percent of the unit
Landform: Terraces in river valleys
Slope: 0 to 1 percent
Drainage class: Poorly drained
Ecological site: Clay Lowland (pe30-37)

7171—Reading silt loam, moderately wet, rarely flooded

Map Unit Composition

Reading: 90 percent
Minor components: 10 percent

Component Descriptions

Reading

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Terraces in river valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 4.9 LEP)
Flooding hazard: Rare
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Lowland (pe30-37)
Land capability (nonirrigated): 1

Typical Profile:
Ap—0 to 9 inches; silt loam
A—9 to 18 inches; silt loam
Bt—18 to 48 inches; silty clay loam
BC—48 to 54 inches; silty clay loam
C—54 to 80 inches; silty clay loam

Minor Components

Chase
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland (pe30-37)

Zook
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clay Lowland (pe30-37)

7206—Aksarben silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Aksarben: 87 percent
Minor components: 13 percent

Component Descriptions

Aksarben

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Interfluves on uplands
Parent material: Loess
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.7 inches)
Shrink-swell potential: High (about 7.4 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
A—6 to 12 inches; silty clay loam
Bt—12 to 42 inches; silty clay loam
BC—42 to 60 inches; silty clay loam
C—60 to 80 inches; silty clay loam

Minor Components

Marshall
Extent: About 4 percent of the unit
Landform: Interfluves on uplands
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Wymore
Extent: About 4 percent of the unit
Landform: Interfluves on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Kennebec
Extent: About 3 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

Judson
Extent: About 2 percent of the unit
Landform: Fan remnants on uplands
Slope: 2 to 6 percent

Drainage class: Well drained
Ecological site: Loamy Lowland (pe30-37)

7207—Aksarben silty clay loam, 5 to 11 percent slopes

Map Unit Composition

Aksarben: 85 percent
Minor components: 15 percent

Component Descriptions

Aksarben

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Loess
Slope: 5 to 11 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.7 inches)
Shrink-swell potential: High (about 7.4 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
A—6 to 10 inches; silty clay loam
Bt—10 to 40 inches; silty clay loam
BC—40 to 60 inches; silty clay loam
C—60 to 80 inches; silty clay loam

Minor Components

Judson
Extent: About 3 percent of the unit
Landform: Fan remnants on uplands
Slope: 2 to 6 percent
Drainage class: Well drained
Ecological site: Loamy Lowland (pe30-37)

Kennebec
Extent: About 3 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

Marshall
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Morrill
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Loamy Lowland (pe30-37)

Wymore
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 9 percent
Drainage class: Moderately well drained
Ecological site: Clay upland (pe30-37)

7220—Burchard clay loam, 6 to 12 percent slopes

Map Unit Composition

Burchard: 85 percent
Minor components: 15 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Fine-loamy drift
Slope: 6 to 12 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Moderate (about 5.6 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 9 inches; clay loam
A—9 to 13 inches; clay loam
Bt—13 to 19 inches; clay loam
Btk—19 to 29 inches; clay loam
BCk—29 to 37 inches; clay loam
C—37 to 60 inches; loam

Minor Components

Pawnee
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Steinauer
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Limy Upland (pe30-37)

7224—Burchard-Steinauer clay loams, 6 to 12 percent slopes

Map Unit Composition

Burchard: 63 percent
Steinauer: 27 percent
Minor components: 10 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Fine-loamy drift
Slope: 6 to 12 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.2 inches)
Shrink-swell potential: Moderate (about 5.4 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 7 inches; clay loam
Bt—7 to 22 inches; clay loam
BC—22 to 37 inches; clay loam
C—37 to 60 inches; clay loam

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Calcareous fine-loamy drift
Slope: 8 to 12 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
A—0 to 6 inches; clay loam
AC—6 to 13 inches; clay loam
C—13 to 60 inches; clay loam

Minor Components

Kipson
Extent: About 4 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 25 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Limy Upland (pe30-37)

Pawnee
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Wymore
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7225—Burchard-Steinauer clay loams, 12 to 18 percent slopes

Map Unit Composition

Burchard: 55 percent
Steinauer: 40 percent
Minor components: 5 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Fine-loamy drift
Slope: 12 to 18 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.4 inches)
Shrink-swell potential: Moderate (about 5.6 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
Ap—0 to 9 inches; clay loam
Bt—9 to 19 inches; clay loam
Btk—19 to 29 inches; clay loam
BCk—29 to 37 inches; clay loam
C—37 to 60 inches; loam

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous fine-loamy drift
Slope: 12 to 18 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; clay loam
AC—6 to 14 inches; clay loam
C—14 to 80 inches; clay loam

Minor Components

Padonia
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 25 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clay Upland (pe30-37)

7233—Elmont silt loam, 3 to 7 percent slopes

Map Unit Composition

Elmont: 85 percent
Minor components: 15 percent

Component Descriptions

Elmont

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Silty and clayey residuum derived from shale and siltstone
Slope: 3 to 7 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 8.9 inches)

Shrink-swell potential: Moderate (about 5.4 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 9 inches; silt loam
Bt—9 to 26 inches; silty clay loam
BC—26 to 37 inches; silty clay loam
C—37 to 45 inches; silty clay loam
Cr—45 to 49 inches; weathered bedrock

Minor Components

Pawnee
Extent: About 8 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Vinland
Extent: About 7 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 25 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Loamy Upland (pe30-37)

7301—Martin silty clay loam, 1 to 3 percent slopes

Map Unit Composition

Martin: 85 percent
Minor components: 15 percent

Component Descriptions

Martin

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Footslopes
Parent material: Silty and clayey colluvium derived from limestone-shale over silty and clayey residuum derived from limestone-shale
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 22 to 26 inches
Surface runoff class: Medium
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
BA—6 to 12 inches; silty clay loam
Bt—12 to 53 inches; silty clay
C—53 to 80 inches; silty clay

Minor Components

Chase
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7424—Morrill clay loam, 3 to 7 percent slopes, eroded

Map Unit Composition

Morrill: 90 percent
Minor components: 10 percent

Component Descriptions

Morrill

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Fine-loamy till
Slope: 3 to 7 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.1 inches)
Shrink-swell potential: Moderate (about 5.1 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; clay loam
Bt—6 to 27 inches; clay loam
BC—27 to 41 inches; clay loam
C—41 to 60 inches; sandy clay loam

Minor Components

Pawnee
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent

Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7433—Morrill loam, 3 to 7 percent slopes

Map Unit Composition

Morrill: 90 percent
Minor components: 10 percent

Component Descriptions

Morrill

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Fine-loamy till
Slope: 3 to 7 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.1 inches)
Shrink-swell potential: Moderate (about 5.1 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 10 inches; loam
Bt—10 to 29 inches; clay loam
BC—29 to 41 inches; clay loam
C—41 to 60 inches; sandy clay loam

Minor Components

Pawnee
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7435—Morrill loam, 7 to 12 percent slopes

Map Unit Composition

Morrill: 100 percent

Component Descriptions

Morrill

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Loamy till or outwash
Slope: 7 to 12 percent
Drainage class: Well drained

Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.0 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe 30-37)
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 12 inches; loam
Bt—12 to 40 inches; clay loam
C—40 to 60 inches; sandy clay loam

7436—Morrill loam, 7 to 12 percent slopes, eroded

Map Unit Composition

Morrill: 87 percent
Minor components: 13 percent

Component Descriptions

Morrill

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Glacial drift
Slope: 7 to 12 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.4 inches)
Shrink-swell potential: Moderate (about 4.7 LEP)
Flooding hazard: None
Ponding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 6 inches; loam
BA—6 to 12 inches; loam
Bt1—12 to 22 inches; loam
Bt2—22 to 43 inches; sandy clay loam
C—43 to 80 inches; stratified fine sandy loam to loamy fine sand to sand

Minor Components

Kennebec
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

Pawnee
Extent: About 5 percent of the unit

Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Olmitz
Extent: About 3 percent of the unit
Landform: Fan terraces on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Loamy Upland (pe30-37)

7455—Olmitz loam, 1 to 5 percent slopes

Map Unit Composition

Olmitz: 91 percent
Minor components: 9 percent

Component Descriptions

Olmitz

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Fan terraces on uplands
Hillslope position: Footslopes
Parent material: Fine-loamy colluvium
Slope: 1 to 5 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 4.3 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:
Ap—0 to 6 inches; loam
A—6 to 25 inches; loam
Bw—25 to 44 inches; clay loam
BC—44 to 60 inches; clay loam

Minor Components

Chase
Extent: About 3 percent of the unit
Landform: Flood-plain steps in valleys
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland (pe30-37)

Pawnee
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent

Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Wymore
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7470—Padonia-Martin silty clay loams, 5 to 9 percent slopes

Map Unit Composition

Padonia: 50 percent
Martin: 40 percent
Minor components: 10 percent

Component Descriptions

Padonia

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Residuum derived from shale, calcareous
Slope: 5 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 6.5 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
A—0 to 11 inches; silty clay loam
Bt—11 to 22 inches; silty clay
Btk—22 to 32 inches; silty clay
BCk—32 to 37 inches; silty clay loam
Cr—37 to 40 inches; weathered bedrock

Martin

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Footslopes, backslopes
Parent material: Silty and clayey colluvium derived from limestone-shale over silty and clayey residuum derived from limestone-shale
Slope: 5 to 9 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)

Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 22 to 26 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
BA—6 to 12 inches; silty clay loam
Bt—12 to 53 inches; silty clay
C—53 to 80 inches; silty clay

Minor Components

Kipson
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 30 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Limy Upland (pe30-37)

7500—Pawnee clay loam, 1 to 3 percent slopes

Map Unit Composition

Pawnee: 90 percent
Minor components: 10 percent

Component Descriptions

Pawnee

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, summits
Parent material: Clayey drift
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 7.5 inches)
Shrink-swell potential: High (about 7.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: Medium
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:
Ap—0 to 8 inches; clay loam
BA—8 to 15 inches; clay loam
Bt—15 to 41 inches; clay
BC—41 to 51 inches; clay
C—51 to 60 inches; clay loam

Minor Components

Burchard
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 7 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Morrill
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

7502—Pawnee clay loam, 3 to 7 percent slopes

Map Unit Composition

Pawnee: 85 percent
Minor components: 15 percent

Component Descriptions

Pawnee

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Clayey drift
Slope: 3 to 7 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 7.2 inches)
Shrink-swell potential: High (about 7.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 7 inches; clay loam
AB—7 to 12 inches; clay loam
Bt—12 to 41 inches; clay
BC—41 to 51 inches; clay
C—51 to 60 inches; clay loam

Minor Components

Baileyville
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Burchard
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Morrill
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

7510—Pawnee clay, 3 to 7 percent slopes, eroded

Map Unit Composition

Pawnee: 80 percent
Minor components: 20 percent

Component Descriptions

Pawnee

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Clayey drift
Slope: 3 to 7 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 6.8 inches)
Shrink-swell potential: High (about 7.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 6 inches; clay
Bt—6 to 39 inches; clay
BC—39 to 51 inches; clay
C—51 to 60 inches; clay loam

Minor Components

Burchard
Extent: About 8 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Kipson
Extent: About 7 percent of the unit

Landform: Hillslopes on uplands
Slope: 5 to 25 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Limy Upland (pe30-37)

Baileyville
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7603—Sibleyville loam, 3 to 7 percent slopes

Map Unit Composition

Sibleyville: 90 percent
Minor components: 10 percent

Component Descriptions

Sibleyville

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Sandy and silty residuum derived from sandstone and shale
Slope: 3 to 7 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.3 inches)
Shrink-swell potential: Moderate (about 3.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 9 inches; loam
BA—9 to 14 inches; loam
Bt—14 to 23 inches; loam
C—23 to 37 inches; channery loam
Cr—37 to 41 inches; weathered bedrock

Minor Components

Morrill
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit

Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7608—Steinauer clay loam, 12 to 25 percent slopes

Map Unit Composition

Steinauer: 90 percent
Minor components: 10 percent

Component Descriptions

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous fine-loamy till
Slope: 12 to 25 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Limy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; clay loam
AC—6 to 13 inches; clay loam
C—13 to 60 inches; clay loam

Minor Components

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 8 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Rock outcrop
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands

7656—Vinland variant loam, 5 to 25 percent slopes

Map Unit Composition

Vinland variant: 90 percent
Minor components: 10 percent

Component Descriptions

Vinland

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Coarse-silty residuum derived from sandstone and shale
Slope: 5 to 25 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Low (about 5.2 inches)
Shrink-swell potential: Low (about 1.6 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland (pe30-37)
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 8 inches; loam
Bw—8 to 24 inches; loam
C—24 to 29 inches; loam
Cr—29 to 33 inches; weathered bedrock

Minor Components

Elmont
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 7 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 4 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7681—Wymore silty clay loam, 1 to 3 percent slopes

Map Unit Composition

Wymore: 90 percent
Minor components: 10 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, summits
Parent material: Clayey loess
Slope: 1 to 3 percent

Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: High (about 9.6 inches)
Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:
Ap—0 to 8 inches; silty clay loam
AB—8 to 11 inches; silty clay loam
Bt1—11 to 37 inches; silty clay
Bt2—37 to 45 inches; silty clay loam
BC—45 to 51 inches; silty clay loam
C—51 to 79 inches; silty clay loam

Minor Components

Baileyville
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 3 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7684—Wymore silty clay loam, 3 to 6 percent slopes, eroded

Map Unit Composition

Wymore: 95 percent
Minor components: 5 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Parent material: Clayey loess
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 8.5 inches)
Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
Bt1—6 to 34 inches; silty clay
Bt2—34 to 42 inches; silty clay

BC—42 to 53 inches; silty clay loam
C—53 to 79 inches; silty clay loam

Minor Components

Benfield
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Loamy Upland (pe30-37)

7688—Wymore-Baileyville complex, 3 to 6 percent slopes, eroded

Map Unit Composition

Wymore: 45 percent
Baileyville: 40 percent
Minor components: 15 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes, shoulders
Parent material: Clayey loess
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 8.5 inches)
Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: High
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; silty clay loam
Bt1—6 to 34 inches; silty clay
Bt2—34 to 42 inches; silty clay
BC—42 to 53 inches; silty clay loam
C—53 to 79 inches; silty clay loam

Baileyville

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Clayey loess over loamy pedisediment over clayey till
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately low (about 0.06 inch per hour)
Available water capacity: Moderate (about 7.7 inches)

Shrink-swell potential: Very high (about 9.9 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Surface runoff class: Medium
Ecological site: Clay Upland (pe30-37)
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; silty clay
Bt1—6 to 19 inches; silty clay
Bt2—19 to 32 inches; silty clay
2Ab—32 to 36 inches; silty clay loam
2Btb1—36 to 43 inches; silty clay loam
3Btb2—43 to 48 inches; clay loam
3Btb3—48 to 76 inches; clay

Minor Components

Otoe
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 4 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

Pawnee
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clay Upland (pe30-37)

7851—Judson silt loam, 1 to 5 percent slopes

Map Unit Composition

Judson: 95 percent
Minor components: 5 percent

Component Descriptions

Judson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Fan remnants on uplands
Hillslope position: Footslopes
Parent material: Loamy colluvium
Slope: 1 to 5 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very high (about 13.0 inches)
Shrink-swell potential: Moderate (about 4.7 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Lowland (pe30-37)
Land capability (nonirrigated): 2e

Typical Profile:

Ap—0 to 7 inches; silt loam
A—7 to 25 inches; silt loam
AB—25 to 40 inches; silty clay loam
Bw—40 to 50 inches; silty clay loam
BC—50 to 80 inches; silty clay loam

Minor Components

Kennebec

Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Loamy Lowland (pe30-37)

9971—Arents, earthen dam

Component Description

Arents, earthen dam, are barriers constructed to control the flow or raise the level of water. The dams are generally constructed with earthen material. They may be covered with earthy material or armored with concrete or rock.

9983—Gravel pits and quarries

Component Description

Pits are open excavations from which soil and commonly underlying material have been removed, exposing either rock or other material. Kinds include Pits, mine; Pits, gravel; and Pits, quarry. Commonly, pits are closely associated with Dumps.

9986—Miscellaneous water

Component Description

Miscellaneous water includes small manmade water areas used for industrial, sanitary, or mining applications that contain water most of the year.

9999—Water

Component Description

Water includes streams, lakes, ponds, and estuaries. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered with water throughout the year.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair, poor, and very poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in table 5. The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and

long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 7 shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *rangeland composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the "National Range and Pasture Handbook."

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

In order for windbreaks to fulfill their intended purpose, the trees and shrubs selected for planting should be adapted to the soil on the planting site. Selecting adapted species helps to ensure survival and maximum growth rate. Permeability, available water capacity, fertility, soil depth, and soil texture greatly affect the growth rate.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on

measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in tables 9a and 9b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 9a and 9b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that

affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or

maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for

soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 11a and 11b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and

amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 12a and 12b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of

the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The

surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 13a and 13b show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly

ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings. The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy

metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a

water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

Tables 14a and 14b give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 14a, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, or topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical

sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate

gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 16 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 2). “Loam,” for

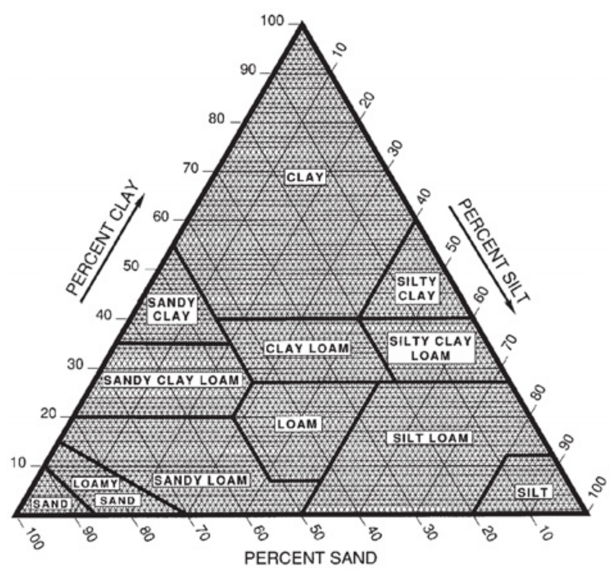

Figure 2.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 17 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as

classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. Descriptions of these groups are available in the “National Soil Survey Handbook” (USDA, 2003).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Soil Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 20 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998; Soil Survey Staff, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is *Udoll* (*Ud*, meaning humid, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludolls (*Hapl*, meaning minimal horizonation, plus *udolls*, the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective Typic identifies the subgroup that typifies the great group. An example is Typic Hapludolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, superactive, mesic Typic Hapludolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of each soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in

the survey area is described. The detailed descriptions of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1988). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Aksarben Series

The Aksarben series consists of very deep, well drained soils that formed in loess. These soils are on uplands. Permeability is moderately slow. Slopes range from 0 to 11 percent. The mean annual temperature is about 52 degrees F, and the mean annual precipitation is about 29 inches.

Taxonomic classification: Fine, smectitic, mesic Typic Argiudolls

Typical Pedon

Aksarben silty clay loam, on a convex slope of 1 percent, in a cultivated field about 6 miles south and 4 miles east of Wahoo, in Saunders County, Nebraska; 810 feet north and 1,875 feet west of the southeast corner of sec. 4, T. 13 N., R. 8 E.; Wahoo SE. USGS topographic quadrangle; lat. 41 degrees 07 minutes 12 seconds N. and long. 96 degrees 31 minutes 39 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, friable; many very fine and fine roots throughout; many fine and medium tubular pores; moderately acid; abrupt smooth boundary.

A—6 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable; many very fine and fine roots throughout; many fine and medium tubular pores; moderately acid; clear smooth boundary.

Bt1—12 to 18 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to strong fine subangular blocky; hard, firm; common fine roots throughout; common fine tubular pores; many faint very dark grayish brown (10YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; slightly acid; clear smooth boundary.

Bt2—18 to 26 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; few fine faint dark yellowish brown (10YR 4/6) iron masses in the soil matrix; the iron accumulations are relict redoximorphic features; moderate coarse subangular blocky structure parting to strong fine and medium subangular blocky; hard, firm; few fine roots throughout; few fine tubular pores; many faint dark brown (10YR 3/3) continuous clay films (cutans) on vertical and horizontal faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt3—26 to 34 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; prominent strong brown (7.5YR 5/6) iron masses in the soil matrix; the iron accumulations are relict redoximorphic features; moderate coarse prismatic structure parting to strong medium subangular blocky; hard, firm; few very fine roots throughout; few very fine tubular pores; many faint dark brown (10YR 3/3) continuous clay films (cutans) on vertical and horizontal faces of peds; common fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt4—34 to 42 inches; brown (10YR 5/3) silty clay loam, pale brown (10YR 6/3) dry; prominent strong brown (7.5YR 5/6) iron masses in the soil matrix; the iron accumulations are relict redoximorphic features; strong coarse prismatic structure

parting to moderate medium subangular blocky; hard, firm; few very fine roots throughout; common very fine tubular pores; common distinct brown (10YR 4/3) discontinuous clay films (cutans) on vertical and horizontal faces of peds; common fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

BC—42 to 60 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; many coarse distinct yellowish brown (10YR 5/6) iron masses in the soil matrix; the iron accumulations are relict redoximorphic features; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; few very fine roots throughout; common fine tubular pores; common discontinuous pressure faces on vertical faces of peds; many fine and medium irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

C—60 to 80 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; many fine prominent strong brown (7.5YR 5/8) and common medium strong brown (7.5YR 5/6) iron masses in the soil matrix; the iron accumulations are relict redoximorphic features; massive; hard, friable; common fine tubular pores; discontinuous pressure faces on vertical faces of peds; many fine and medium irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 6 to 20 inches
Depth to redoximorphic concentrations: 12 to 36 inches; the mottling pattern is a relict feature and is not considered indicative of present drainage conditions.
Thickness of the mollic epipedon: 10 to 24 inches (extends into the upper part of the Bt horizon)
Thickness of the solum: 30 to 72 inches
Reaction: Moderately acid or strongly acid in the most acid part of the solum
Particle-size control section (weighted average): Silty clay loam
Content of clay in the particle-size control section (weighted average): 35 to 42 percent

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2, moist or dry
Texture—silty clay loam
Content of clay—27 to 35 percent
Reaction—slightly acid to strongly acid
Thickness of the horizon—6 to 20 inches

Bt horizon:
Hue—10YR (upper part); 10YR or 2.5Y (lower part)
Value—3 or 4 moist, 4 or 5 dry (upper part); 4 to 6 moist, 5 to 7 dry (lower part)
Chroma—2 or 3 (upper part); 2 to 4 (lower part) (moist or dry for both)
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam or silty clay
Content of clay—35 to 42 percent
Reaction—slightly acid to strongly acid
Thickness of the horizon—18 to 48 inches
Special features—redoximorphic concentrations that are considered relict

BC horizon:
Hue—10YR or 2.5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4, moist or dry

Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam
Content of clay—27 to 35 percent
Reaction—slightly acid to moderately acid
Thickness of the horizon—6 to 20 inches
Special features—redoximorphic concentrations that are considered relict

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4, moist or dry
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam or silt loam
Content of clay—24 to 35 percent
Reaction—neutral to slightly acid
Special features—redoximorphic concentrations that are considered relict

Baileyville Series

The Baileyville series consists of very deep, moderately well drained soils that formed in loess, pedisediment, and a paleosol that formed in glacial till. These soils are on loess-covered glaciated uplands. Permeability is slow or very slow. Slopes range from 1 to 7 percent. The mean annual precipitation is about 35 inches, and the mean annual air temperature is about 55 degrees F.

Taxonomic classification: Fine, smectitic, mesic Oxyaquic Vertic Argiudolls

Typical Pedon

Baileyville silty clay, on a convex northeast-facing slope of 3 percent, in a cultivated field about 2 miles west and 1 mile north of Seneca, in Nemaha County, Kansas; 1,760 feet west and 980 feet north of the southeast corner of sec. 19, T. 2 S., R. 12 E.; Seneca USGS topographic quadrangle; lat. 39 degrees 51 minutes 29.52 seconds N. and long. 96 degrees 06 minutes 52.9 seconds W. When described, the soil was moist throughout. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; very dark gray (10YR 3/1) exterior, silty clay; moderate fine granular structure; friable, hard, moderately sticky and moderately plastic; common fine and medium roots throughout; noneffervescent (by HCl, 1N); slightly acid; linear extensibility percent is 8; abrupt smooth boundary.

Bt1—5 to 10 inches; very dark gray (10YR 3/1) exterior, silty clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm, very hard, very sticky and very plastic; common fine and medium roots throughout; common faint very dark gray (10YR 3/1) (moist) clay films on all faces of peds; noneffervescent (by HCl, 1N); moderately acid; linear extensibility percent is 13; gradual smooth boundary.

Bt2—10 to 13 inches; very dark grayish brown (10YR 3/2) exterior, silty clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm, very hard, very sticky and very plastic; common fine and few medium roots throughout; common discontinuous distinct very dark gray (10YR 3/1) (moist) clay films on all faces of peds; noneffervescent (by HCl, 1N); moderately acid; 10YR 3/1 fill in old crack channels; linear extensibility percent is 10; gradual smooth boundary.

Bt3—13 to 19 inches; dark grayish brown (10YR 4/2) exterior, silty clay; weak medium

prismatic structure parting to moderate fine and medium subangular blocky; firm, very hard, very sticky and very plastic; common fine roots throughout; common discontinuous distinct very dark grayish brown (10YR 3/2) (moist) clay films on all faces of peds; 2 percent prominent spherical iron-manganese concretions throughout and common fine prominent irregular strong brown (7.5YR 5/6) (moist) masses of oxidized iron infused into matrix adjacent to pores; noneffervescent (by HCl, 1N); slightly acid; 10YR 3/1 fill in old crack channels; linear extensibility percent is 7; gradual smooth boundary.

Bt4—19 to 32 inches; grayish brown (2.5Y 5/2) exterior, silty clay ; weak medium prismatic structure parting to moderate and fine subangular blocky; firm, very hard, very sticky and very plastic; few fine roots throughout; common discontinuous distinct dark grayish brown (10YR 4/2) (moist) clay films on all ped faces; 2 percent prominent spherical iron-manganese concretions throughout and common prominent irregular strong brown (7.5YR 5/6) (moist) masses of oxidized iron infused into matrix along ped faces; noneffervescent (by HCl, 1N); neutral; 10YR 3/1 fill in old crack channels; linear extensibility percent is 4; abrupt smooth boundary.

2Ab—32 to 36 inches; dark gray (10YR 4/1) exterior, silty clay loam; weak fine and medium subangular blocky structure; friable; slightly hard, slightly sticky and slightly plastic; few fine roots throughout; common fine prominent irregular brown (7.5YR 4/4) (moist) masses of oxidized iron infused into matrix along ped faces; noneffervescent (by HCl, 1N); neutral; linear extensibility percent is 3; clear smooth boundary.

2Btb1—36 to 43 inches; brown (7.5YR 4/2) exterior, silty clay loam; weak medium prismatic structure parting to weak fine and medium subangular blocky; firm, hard, moderately sticky and moderately plastic; few fine roots throughout; few discontinuous distinct very dark grayish brown (10YR 3/2) (moist) clay films on all ped faces; 2 percent fine distinct spherical iron-manganese concretions and common fine and medium distinct irregular reddish brown (5YR 4/4) (moist) and dark brown (7.5YR 3/4) (moist) masses of oxidized iron with diffuse boundaries infused into matrix along ped faces; noneffervescent (by HCl, 1N); neutral; linear extensibility percent is 5; gradual smooth boundary.

3Btb2—43 to 48 inches; brown (7.5YR 4/2) exterior, clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm, hard, moderately sticky and moderately plastic; few fine roots between peds; few discontinuous distinct very dark grayish brown (10YR 3/2) (moist) clay films on all ped faces; 2 percent fine distinct spherical iron-manganese concretions and common fine and medium prominent irregular reddish brown (5YR 4/4) (moist) and distinct irregular strong brown (7.5YR 4/6) (moist) masses of oxidized iron with diffused boundaries infused into matrix along ped faces and common irregular gray (10YR 5/1) (moist) iron depletions infused into matrix along ped faces; noneffervescent (by HCl, 1N); neutral; linear extensibility percent is 7; gradual smooth boundary.

3Btb3—48 to 62 inches; brown (7.5YR 4/3) exterior, clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very firm, very hard, very sticky; common discontinuous distinct brown (7.5YR 4/2) (moist) clay films on all ped faces; 2 percent fine prominent spherical iron-manganese concretions throughout and common fine and medium prominent irregular reddish brown (5YR 4/4) and distinct irregular strong brown (7.5YR 4/6) (moist) masses of oxidized iron infused into the matrix along ped faces and common irregular gray (10YR 5/1) (moist) iron depletions infused into matrix along ped faces; 2 percent subrounded very strongly cemented 2 to 15 mm quartzite fragments; noneffervescent (by HCl, 1N); neutral; linear extensibility percent is 10; gradual smooth boundary.

3Btb4—62 to 76 inches; strong brown (7.5YR 5/6) exterior, clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very firm, very hard, very sticky and very plastic; common discontinuous distinct brown (7.5YR 4/2) (moist) clay films on all ped faces; 2 percent fine prominent spherical iron-manganese concretions throughout and common fine and medium prominent irregular reddish brown (5YR 5/4) (moist) and red (2.5YR 4/6) (moist) masses of oxidized iron infused into the matrix along ped faces and common prominent irregular gray (10YR 5/1) (moist) iron depletions infused into matrix along ped faces; 3 percent subrounded very strongly cemented 2 to 15 mm quartzite fragments; noneffervescent (by HCl, 1N); linear extensibility percent is 8; neutral.

Range in Characteristics

Soil moisture regime: Udic; the soil is wet in the control section from March through May.
Mean annual soil temperature: 53 to 57 degrees F
Depth to argillic horizon: 4 to 10 inches
Depth to pedisediment: 21 to 39 inches
Depth to glacial till: 30 to 59 inches
Depth to secondary calcium carbonate, in some pedons: 15 to 35 inches; carbonates are generally in the form of concretions.
Depth to redoximorphic concentrations: 12 to 30 inches
Redoximorphic features: Features in the form of iron masses and iron and manganese concretions are in the middle to lower subsoil and the underlying layers. In some pedons, the upper part of the subsoil may contain redoximorphic features which often may be masked by the matrix color.
Depth to episaturation: 18 to 36 inches from March through May
Depth to a marked sand increase: 21 to 39 inches; sand increases from less than 2 percent to more than 10 percent.
Thickness of the mollic epipedon: 10 to 24 inches
Content of clay in the particle-size control section (weighted average): 42 to 55 percent
Content of sand in the particle-size control section (weighted average): 1 to 2 percent
Other features: A thin AB horizon may be present in some pedons. A thin BC horizon may be present in some pedons. Slickensides may be present in some pedons.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay or silty clay loam
Content of clay—30 to 45 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—1 to 3; 1 (upper part)
Texture—silty clay or silty clay loam
Content of clay—35 to 55 percent
Content of sand—less than 2 percent
Reaction—moderately acid to neutral

2Ab horizon (if it occurs):
Hue—7.5YR or 10YR
Value—3 or 4 moist, 4 or 5 dry
Chroma—1 or 2

Texture—silty clay loam
Reaction—slightly acid or neutral

2Bt horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5 moist, 5 or 6 dry
Chroma—2 to 4
Texture—silty clay loam or silty clay
Content of clay—27 to 45 percent
Content of sand—1 to 18 percent
Reaction—slightly acid or neutral

3Bt horizon:
Hue—5YR to 10YR
Value—4 or 5 moist, 5 or 6 dry
Chroma—2 to 6
Texture—clay, clay loam, or silty clay
Content of clay—35 to 55 percent
Content of sand—more than 10 percent
Reaction—slightly acid to slightly alkaline

Benfield Series

The Benfield series consists of moderately deep, well drained soils that formed in clayey pedisediment over clayey residuum derived from alkaline shale. These soils are on uplands. Permeability is slow. Slopes range from 3 to 35 percent. The mean annual temperature is about 55 degrees F, and the mean annual precipitation is about 30 inches.

Taxonomic classification: Fine, mixed, superactive, mesic Udertic Argiustolls

Typical Pedon

Benfield silty clay loam, in an area of native range about 3 miles west and 3.5 miles north of Manhattan, in Riley County, Kansas; 1,530 feet east and 40 feet north of the southwest corner of sec. 27, T. 9 S., R. 7 E.; Keats USGS topographic quadrangle. (Colors are for dry soil unless otherwise indicated.)

A1—0 to 6 inches; black (10YR 2/1) exterior, gravelly silty clay loam, very dark gray (10YR 3/1) exterior, dry; moderate medium granular structure; friable, hard; many fine roots throughout; 20 percent subangular 20 to 75 mm cherty limestone fragments; noneffervescent; clear wavy boundary.

A2—6 to 12 inches; very dark brown (10YR 2/2) exterior, gravelly silty clay loam, very dark grayish brown (10YR 3/2) exterior, dry; moderate very fine and fine subangular blocky structure; firm; many fine roots throughout; 5 percent subangular 75 to 250 mm cherty limestone fragments and 20 percent subangular 20 to 75 mm cherty limestone fragments; noneffervescent; clear wavy boundary.

2Bt1—12 to 20 inches; very dark brown (7.5YR 2/3) exterior and dark brown (7.5YR 3/3) crushed, silty clay; moderate fine subangular blocky structure; very firm; common fine roots throughout; 15 percent patchy distinct very dark brown (7.5YR 2/3) (moist) clay films on faces of peds; 5 percent subangular 2 to 75 mm cherty limestone fragments; noneffervescent; gradual wavy boundary.

2Bt2—20 to 26 inches; reddish brown (5YR 4/3) crushed, and dark reddish brown (5YR 3/3) exterior, silty clay; moderate medium subangular blocky structure; very firm; common fine roots throughout; 15 percent patchy distinct dark brown (7.5YR 3/2) (moist) clay films on faces of peds; strong effervescence; clear wavy boundary.

2Btk—26 to 33 inches; dark reddish gray (5YR 4/2) exterior, silty clay; weak medium

subangular blocky structure; firm; common fine roots throughout; 5 percent patchy distinct dark brown (7.5YR 3/3) (moist) clay films on faces of peds; 5 percent fine spherical carbonate nodules between peds; strong effervescence; abrupt wavy boundary.

3BCk—33 to 39 inches; olive (5Y 5/4) exterior, very paragravelly silty clay loam; weak fine subangular blocky structure; firm; 10 percent fine irregular carbonate nodules between peds; 60 percent rounded 2 to 75 mm shale fragments; violent effervescence; clear wavy boundary.

3Cr—39 to 44 inches; weathered, calcareous, olive colored shale.

Range in Characteristics

Depth to paralithic contact: 20 to 40 inches
Thickness of the mollic epipedon: 7 to 20 inches to shale
Content of rock fragments: 0 to 30 percent from 2 mm to 3 inches in diameter; fewer coarse fragments ranging from 3 to 10 inches in diameter

A horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2, dry or moist
Texture—gravelly silty clay loam, silt loam, or silty clay loam
Content of clay—25 to 35 percent
Reaction—slightly acid to slightly alkaline

2Bt horizon:
Hue—5YR to 10YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 6, dry or moist
Texture—silty clay, silty clay loam, clay, or their gravelly counterparts
Content of clay—35 to 60 percent
Reaction—neutral to moderately alkaline

3BC horizon:
Hue—5YR to 5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4, dry or moist
Texture—silty clay loam, clay, or silty clay, or their paragravelly counterparts
Reaction—slightly alkaline or moderately alkaline

Burchard Series

The Burchard series consists of very deep, well drained soils that formed in calcareous glacial till. These soils are on uplands. Permeability is moderately slow. Slopes range from 2 to 40 percent. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 54 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Burchard clay loam, on a slope of 8 percent, in an area of native rangeland about 1 mile north and 2 miles east of Burchard, in Pawnee County, Nebraska; 400 feet west and 400 feet north of the southeast corner of sec. 5, T. 2 N., R. 10 E.; Burchard USGS topographic quadrangle; lat. 40 degrees 09 minutes 43 seconds N. and long. 96 degrees 18 minutes 50 seconds W. (Colors are for moist soil unless otherwise indicated.)

A—0 to 13 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; moderate

medium and fine granular structure; slightly hard, friable; many very fine and fine and few medium and coarse roots throughout; slightly acid; gradual wavy boundary.

Bt—13 to 19 inches; 60 percent brown (10YR 4/3) and 40 percent mixing of dark grayish brown (10YR 4/2) clay loam, brown (10YR 5/3) and grayish brown (10YR 5/2) dry; moderate fine and very fine subangular blocky structure; hard, friable; thin discontinuous clay films on faces of peds; neutral; clear wavy boundary.

Btk—19 to 29 inches; olive brown (2.5Y 4/4) clay loam, light yellowish brown (2.5Y 6/4) dry; moderate fine subangular blocky structure; hard, friable; common fine and medium roots throughout; thin discontinuous clay films on faces of peds; soft accumulations of segregated lime; slight effervescence; moderately alkaline; gradual wavy boundary.

Bk—29 to 37 inches; light brownish gray (2.5Y 6/2) and dark yellowish brown (10YR 4/4) clay loam, light gray (2.5Y 7/2) dry and yellowish brown (10YR 5/4) dry; moderate medium angular blocky structure; hard, friable; few very fine and fine and medium roots in cracks; many medium and coarse soft accumulations of segregated lime; slight effervescence; moderately alkaline; gradual wavy boundary.

C—37 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, light gray (2.5Y 7/2) dry; weak coarse and medium angular blocky structure; hard, firm; many fine seams and pockets of soft lime; 5 percent gravel, by volume; many coarse distinct yellowish brown (10YR 5/4) soft masses of iron accumulation; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 8 to 18 inches
Depth to secondary calcium carbonate: 12 to 30 inches
Depth to redoximorphic concentrations (if they occur): 22 to 80 inches
Content of clay in the particle-size control section (weighted average): 27 to 35 percent
Content of sand in the particle-size control section (weighted average): 20 to 45 percent fine and coarser sand
Content of rock fragments in the particle-size control section (weighted average): 1 to 10 percent gravel, by volume

A horizon:
Hue—10YR
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—loam, silt loam, or clay loam
Content of clay—18 to 30 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 to 6
Texture—clay loam
Content of clay—27 to 35 percent; as much as 38 percent in some pedons
Reaction—slightly acid or neutral

Btk horizon:
Hue—10YR or 2.5Y
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 to 6
Texture—loam or clay loam
Content of clay—18 to 30 percent

Calcium carbonate equivalent—5 to 10 percent
Reaction—slightly alkaline or moderately alkaline

Bk horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 to 6
Texture—loam or clay loam
Content of clay—18 to 30 percent
Calcium carbonate equivalent—5 to 10 percent
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—6 or 7, moist or dry
Chroma—2 or 3
Texture—loam or clay loam
Content of clay—25 to 35 percent
Content of sand—30 to 45 percent
Calcium carbonate equivalent—10 to 15 percent
Content of gypsum—0 to 2 percent
Reaction—slightly alkaline or moderately alkaline

Calco Series

The Calco series consists of very deep, poorly drained and very poorly drained soils that formed in calcareous alluvium. These soils are on flood plains. Permeability is moderate. Slopes range from 0 to 2 percent. The mean annual air temperature is about 47 degrees F, and the mean annual precipitation is about 31 inches.

Taxonomic classification: Fine-silty, mixed, calcareous, mesic Cumulic Haplaquolls

Taxadjunct statement: The Calco soils in this survey area do not meet the range for the series because they are finely stratified at a depth of 10 to 20 inches. This difference does not significantly affect the use and management of the soils.

Typical Pedon

Calco silt loam, on a 1 percent slope, in a flood plain in a cultivated field, at an elevation of 1,090 feet above sea level, in Cass County, Iowa, about 0.25 mile south of Griswold; about 2,240 feet south and 160 feet east of the northwest corner of sec. 8, T. 74 N., R. 37 W.; Griswold USGS topographic quadrangle; lat. 41 degrees 13 minutes 23.3 seconds N. and long. 95 degrees 08 minutes 9.5 seconds W., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; friable; common fine roots; common fine tubular pores; about 2 percent very fine snail fragments; strongly effervescent; slightly alkaline; abrupt smooth boundary.

A1—8 to 16 inches; black (N 2.5/0) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few very fine roots; common fine tubular pores; about 2 percent very fine snail fragments; strongly effervescent; slightly alkaline; gradual smooth boundary.

A2—16 to 28 inches; black (N 2.5/0) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine subangular blocky structure; friable; few very fine roots; common very fine tubular pores; about 5 percent very fine snail fragments; strongly effervescent; slightly alkaline; gradual smooth boundary.

A3—28 to 38 inches; black (N 2.5/0) silty clay loam, dark gray (10YR 4/1) dry; weak very fine prismatic structure parting to weak fine subangular blocky; friable; common very fine tubular pores; about 4 percent very fine snail fragments; common fine distinct very dark grayish brown (2.5Y 3/2) redoximorphic depletions; strongly effervescent; slightly alkaline; clear smooth boundary.

Bg1—38 to 46 inches; very dark gray (2.5Y 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak very fine prismatic structure parting to weak fine subangular blocky; friable; common very fine tubular pores; about 3 percent very fine snail fragments; common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; strongly effervescent; slightly alkaline; clear smooth boundary.

Bg2—46 to 58 inches; about 95 percent very dark gray (5Y 3/1) and about 5 percent dark gray (5Y 4/1) silt loam, gray (5Y 5/1) dry; weak fine prismatic structure parting to weak medium subangular blocky; friable; common very fine tubular pores; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; very slightly effervescent; moderately alkaline; gradual smooth boundary.

BCg—58 to 69 inches; about 95 percent very dark gray (5Y 3/1) and about 5 percent dark gray (5Y 4/1) silt loam, gray (5Y 5/1) dry; weak medium prismatic structure; friable; common very fine tubular pores; common fine prominent light olive brown (2.5Y 5/4) redoximorphic concentrations; very slightly effervescent; slightly alkaline; abrupt smooth boundary.

Cg—69 to 80 inches; very dark gray (5Y 3/1) silt loam; massive; friable; common very fine tubular pores; common fine prominent dark yellowish brown (10YR 3/4) redoximorphic concentrations; very slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 30 to over 60 inches
Depth to carbonates: 0 to 10 inches
Content of clay in the particle-size control section (weighted average): 24 to 35 percent
Content of sand in the particle-size control section (weighted average): 1 to 15 percent
Other features: Some pedons have subhorizons below a depth of 20 inches that are not effervescent and have a reaction range of neutral or slightly alkaline. Some pedons have an AC horizon.

Ap or A horizon:
Hue—10YR, 5Y, or N
Value—2, 2.5, or 3
Chroma—0 or 1
Texture—silt loam or silty clay loam
Content of clay—24 to 35 percent
Content of sand—1 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Bg or BCg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 to 2
Texture—silt loam or silty clay loam
Content of clay—24 to 35 percent
Content of sand—1 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 6
Chroma—1 to 3
Texture—silty clay loam, silt loam, or loam

Content of clay—24 to 35 percent
Content of sand—1 to 35 percent
Reaction—slightly alkaline or moderately alkaline
Special feature—strata in the Cg horizon that have more clay or more sand in some pedons

Chase Series

The Chase series consists of very deep soils that formed in alluvium. These soils are on flood plains. Permeability is very slow. Slopes range from 0 to 2 percent. The mean annual temperature is 56 degrees F, and the mean annual precipitation is 34 inches.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Chase silty clay loam, in a cultivated field 1 mile northeast of Reading, in Lyon County, Kansas; 330 feet west and 2,000 feet north of the southeast corner of sec. 34, T. 17 S., R. 13 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; few wormcasts; moderately acid; clear smooth boundary.

A—6 to 14 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; few fine irregular shaped iron-manganese concretions; moderately acid; gradual smooth boundary.

BA—14 to 20 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine distinct dark brown (10YR 3/3) masses of iron accumulation; few fine rounded iron-manganese concretions; few fine wormholes; few wormcasts; slightly acid; gradual smooth boundary.

Bt1—20 to 34 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium and fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common medium distinct dark yellowish brown (10YR 4/4) irregularly shaped masses of iron accumulations; few fine rounded iron-manganese concretions; few fine clay films on faces of peds; few fine wormholes; few wormcasts; slightly acid; gradual smooth boundary.

Bt2—34 to 42 inches; very dark brown (10YR 2/2) silty clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine distinct yellowish brown (10YR 5/4) irregularly shaped masses of iron accumulations; few fine rounded iron-manganese concretions; common fine clay films on ped faces; neutral; diffuse smooth boundary.

BC—42 to 54 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; very weak blocky structure; hard, firm, sticky and plastic; few fine distinct yellowish brown (10YR 5/4) irregularly shaped masses of iron accumulations; few fine rounded iron-manganese concretions; neutral; diffuse smooth boundary.

C—54 to 80 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark gray (10YR 4/1) dry; massive; hard, firm, sticky and plastic; few fine distinct yellowish brown (10YR 5/4) irregularly shaped iron accumulations; few fine rounded black iron-manganese concretions; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 12 to 30 inches
Depth to redoximorphic concentrations: 6 to 20 inches

Depth to episaturation: 24 to 48 inches from January through April
Thickness of the mollic epipedon: More than 36 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 20 to 42 inches
Content of clay in the particle-size control section (weighted average): 35 to 55 percent
Content of sand in the particle-size control section (weighted average): 1 to 4 percent

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—12 to 40 percent
Reaction—moderately acid to neutral

BA horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 6 dry
Chroma—1 or 2
Texture—silty clay loam, silty clay, or clay
Content of clay—35 to 55 percent
Reaction—moderately acid to slightly alkaline

C horizon:
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 6 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—27 to 55 percent
Reaction—slightly acid to moderately alkaline; fine carbonate concretions in some pedons

Judson Series

The Judson series consists of very deep, well drained soils that formed in silty colluvium derived from noncalcareous loess. These soils are on footslopes, upland drainageways, and alluvial fans. Slopes range from 0 to 12 percent. The mean annual temperature is about 49 degrees F, and the mean annual precipitation is about 30 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Judson silty clay loam, on a south-facing slope of 4 percent, in a cultivated field about 7 miles north and 3 miles east of Winterset, in Madison County, Iowa; about 2,000 feet south and 300 feet west of the northeast corner of sec. 33, T. 77 N., R. 27 W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry, very

dark grayish brown (10YR 3/2) kneaded; weak medium granular structure; friable; slightly acid; abrupt smooth boundary.

A1—9 to 15 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry, very dark grayish brown (10YR 3/2) kneaded; weak fine granular and weak very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

A2—15 to 22 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry, very dark grayish brown (10YR 3/2) kneaded; weak very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

AB—22 to 28 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry, dark brown (10YR 3/3) kneaded; moderate fine subangular blocky structure; friable; many tubular pores; moderately acid; gradual smooth boundary.

Bt—28 to 35 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry, dark brown (10YR 3/3) kneaded; moderate medium subangular blocky structure; friable; many tubular pores; common very dark grayish brown (10YR 3/2) coatings on faces of peds; very few clay films; slightly acid; gradual smooth boundary.

BC—35 to 52 inches; brown (10YR 4/3) silty clay loam, yellowish brown (10YR 5/4) kneaded; weak coarse subangular blocky structure; friable; many tubular pores; few very dark gray (10YR 3/1) stains on root channels; few fine faint grayish brown (10YR 5/2) redoximorphic depletions; few fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

C—52 to 60 inches; brown (10YR 4/3) silty clay loam; massive; friable; few fine dark oxides; few fine faint grayish brown (10YR 5/2) redoximorphic depletions; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Thickness of the mollic epipedon: 32 to 52 inches
Content of clay in the particle-size control section (weighted average): 30 to 35 percent
Content of sand in the particle-size control section (weighted average): 1 to 10 percent fine and coarser sand

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or silt loam
Content of clay—24 to 32 percent
Content of sand—1 to 10 percent
Reaction—moderately acid to neutral

AB horizon:
Hue—10YR
Value—2 or 3
Chroma—2
Texture—silty clay loam
Content of clay—27 to 32 percent
Content of sand—1 to 10 percent
Reaction—moderately acid to neutral

Bt or Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 to 5
Texture—silty clay loam

Content of clay—30 to 35 percent
Content of sand—1 to 10 percent
Reaction—moderately acid to neutral
Special features—darker coatings on peds are common; mottles of low or high chroma are as shallow as a depth of 30 inches in some pedons

BC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Content of clay—25 to 32 percent
Content of sand—1 to 10 percent
Reaction—slightly acid to slightly alkaline

C horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Content of clay—25 to 32 percent
Content of sand—1 to 10 percent
Reaction—slightly acid to slightly alkaline
Special features—few or common mottles with chroma of 1 to 6 in some pedons

Kennebec Series

The Kennebec series consists of very deep, moderately well drained soils that formed in dark colored silty alluvium with low content of fine sand or coarse sand. These soils are on flood plains and upland drainageways. Slopes range from 0 to 5 percent. The mean annual air temperature is about 49 degrees F, and the mean annual precipitation is about 30 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Kennebec silt loam, on a slope of about 1 percent, in a cultivated area about 7 miles southwest of Dow City, in Crawford County, Iowa; about 2,110 feet north and 62 feet east of the southwest corner of sec. 27, T. 82 N., R. 41 W.; Dunlap NE. USGS topographic quadrangle; lat. 41 degrees 52 minutes 59.5 seconds N. and long. degrees 36 minutes 54.3 seconds W., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; common fine and very fine roots; few fine and very fine pores; slightly acid; clear smooth boundary.
A1—8 to 18 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; common fine and very fine roots; common fine pores; slightly acid; diffuse smooth boundary.
A2—18 to 32 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry, very dark brown (10YR 2/2) crushed; moderate fine and medium subangular blocky structure; friable; common fine and very fine roots; common fine and medium pores; slightly acid; diffuse smooth boundary.
A3—32 to 41 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry, very dark brown (10YR 2/2) crushed; weak fine and medium subangular blocky structure;

friable; few very fine roots; few fine and medium pores; many large wormholes; slightly acid; diffuse smooth boundary.

AC—41 to 54 inches; very dark gray (10YR 3/1) silt loam, very dark grayish brown (10YR 3/2) crushed; weak medium subangular blocky structure; friable; few very fine roots; few very fine pores; slightly acid; diffuse smooth boundary.

C1—54 to 63 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine pores; few fine rounded very dark brown (7.5YR 2.5/2) iron and manganese concretions; common medium faint dark brown (10YR 3/3) and common fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; few fine faint grayish brown (10YR 5/2) redoximorphic depletions; slightly acid; diffuse smooth boundary.

C2—63 to 72 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine pores; common fine prominent dark yellowish brown (10YR 4/6) redoximorphic concentrations; slightly acid; diffuse smooth boundary.

C3—72 to 80 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine pores; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; slightly acid.

Range in Characteristics

Depth to carbonates: More than 80 inches
Thickness of the mollic epipedon: More than 40 inches
Content of clay in the particle-size control section (weighted average): 18 to 30 percent
Content of sand in the particle-size control section (weighted average): Less than 10 percent fine and coarser sand

Ap or A horizon:
Hue—10YR; 10YR (overwash)
Value—2 or 3; 3 or 4 (overwash)
Chroma—1 or 2; 1 or 2 (overwash)
Texture—silt loam or silty clay loam; silt loam (overwash)
Content of clay—18 to 30 percent; 18 to 27 percent (overwash)
Content of sand—less than 10 percent; less than 10 percent (overwash)
Reaction—moderately acid to neutral; moderately acid to neutral (overwash)

AB horizon (if it occurs):
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—18 to 32 percent
Content of sand—less than 10 percent
Reaction—slightly acid or neutral

AC horizon (if it occurs):
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—18 to 32 percent
Content of sand—less than 10 percent
Reaction—slightly acid or neutral

Bw horizon (if it occurs):
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—2 or 3

Texture—silt loam or silty clay loam
Content of clay—24 to 33 percent
Content of sand—less than 15 percent
Reaction—slightly acid or neutral
Special features—iron and manganese concretions, redoximorphic concentrations, and redoximorphic depletions in some pedons

C horizon:
Hue—10YR or 2.5Y
Value—2 to 4
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—24 to 30 percent
Content of sand—less than 15 percent
Reaction—slightly acid or neutral
Special features—iron and manganese concretions, redoximorphic concentrations, and redoximorphic depletions in some pedons

Kipson Series

The Kipson series consists of shallow and very shallow soils that formed in residuum derived from calcareous silty shales. These soils are on uplands. They are somewhat excessively drained. Permeability is moderate. Slopes range from 1 to 15 percent but typically range to 70 percent. The mean annual temperature ranges from 52 to 57 degrees F, and the mean annual precipitation ranges from 25 to 33 inches.

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Udorthentic Haplustolls

Typical Pedon

Kipson silty clay loam, on a slope of 6 percent, in an area of native grassland about 20 miles west of Council Grove, in Morris County, Kansas; 75 feet north and 2,330 feet west of the southeast corner of sec. 29, T. 16 S., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 8 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium and fine granular structure; slightly hard, friable; many fine and very fine roots; strong effervescence; moderately alkaline; clear smooth boundary.

AC—8 to 13 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, friable; common fine and very fine roots; 10 percent gravel, mostly shale; violent effervescence; moderately alkaline; clear wavy boundary.

C—13 to 19 inches; yellow (10YR 7/6) and very pale brown (10YR 7/3) channery silty clay loam, brownish yellow (10YR 6/6) and pale brown (10YR 6/3) moist; massive; slightly hard, friable; few fine and very fine roots; roots spread horizontally on contact with Cr horizon; 30 percent gravel, mostly shale; violent effervescence; moderately alkaline; clear smooth boundary.

Cr—19 to 30 inches; very pale brown (10YR 7/4) and yellow (10YR 7/6) shale and chalky limestone.

Range in Characteristics

Depth to paralithic contact: 6 to 20 inches to silty shale
Depth to secondary calcium carbonate: 0 to 9 inches
Thickness of the mollic epipedon: 6 to 12 inches

Content of clay in the particle-size control section (weighted average): 15 to 35 percent
Content of sand in the particle-size control section (weighted average): 15 to 52 percent

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2, dry or moist
Texture—silt loam or silty clay loam
Content of clay—15 to 35 percent
Reaction—neutral to moderately alkaline

C horizon:
Hue—2.5YR to 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 6, dry or moist
Texture—channery silt loam, channery silty clay loam, channery loam, silt loam, silty clay loam, or loam
Content of clay—18 to 35 percent
Content of pararock fragments—0 to 35 percent, by volume
Reaction—moderately alkaline or strongly alkaline

Leanna Series

The Leanna series consists of very deep, somewhat poorly drained soils that formed in silty or clayey alluvium. These soils are on flood plains. Permeability is very slow. Slopes are generally less than 1 percent, but the range is 0 to 2 percent. The mean annual temperature ranges from 57 to 65 degrees F, and the mean annual precipitation ranges from 35 to 45 inches.

Taxonomic classification: Fine, mixed, superactive, thermic Typic Argialbolls

Typical Pedon

Leanna silt loam, in an area of grassland in Woodson County, Kansas, 5 miles east of Yates Center; 135 feet east and 1,300 feet south of the northwest corner of sec. 14, T. 25 S., R. 16 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; moderately acid; clear smooth boundary.
E—9 to 16 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; few fine faint dark grayish brown (10YR 4/2) mottles; weak fine granular structure; hard, friable, slightly sticky and slightly plastic; common fine roots; strongly acid; abrupt smooth boundary.
Bt—16 to 32 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; few fine distinct dark brown (10YR 4/3) mottles; moderate medium blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; few distinct clay films; moderately acid; gradual smooth boundary.
BC—32 to 52 inches; dark grayish brown (10YR 4/2) silty clay, grayish brown (10YR 5/2) dry; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; moderately acid; diffuse smooth boundary.
C—52 to 80 inches; dark grayish brown (2.5Y 4/2) silty clay loam, grayish brown (2.5Y 5/2) dry; common medium prominent yellowish brown (10YR 5/4) and common medium distinct gray (10YR 6/1) mottles; massive; very hard, very firm, plastic and sticky; few fine roots; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: More than 24 inches
Depth to mottles: 30 inches

A horizon:
Value—2 or 3 moist, 4 or 5 dry
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—strongly acid to slightly acid

E horizon:
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—strongly acid to slightly acid

Bt horizon:
Hue—10YR or 2.5Y
Value—2 or 3 moist, 4 or 5 dry
Chroma—1 or 2; few or common, fine or medium mottles with higher chroma
Texture—silty clay loam, silty clay, or clay
Content of clay—35 to 50 percent
Reaction—strongly acid to slightly acid

BC and C horizons:
Hue—10YR or 2.5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—1 to 3; common or many, medium or coarse mottles
Texture—silty clay or silty clay loam
Reaction—moderately acid to neutral

Marshall Series

The Marshall series consists of very deep, well drained soils that formed in loess. These soils are on uplands and high stream benches. Slopes range from 0 to 20 percent. The mean annual temperature is about 50 degrees F, and the mean annual precipitation is about 31 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Typic Hapludolls

Typical Pedon

Marshall silty clay loam, on a west-facing slope of 3 percent, in a cultivated field about 3 miles northwest of Atlantic, in Cass County, Iowa; 829 feet south of the center of the road and 500 feet east of the center of sec. 34, T. 77 N., R. 37 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1), with chroma slightly more than 1, silty clay loam, very dark brown (10YR 2/2) kneaded, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to weak fine granular; friable; common fine and medium root channels; few very dark grayish brown (10YR 3/2) wormcasts; moderately acid; clear smooth boundary.

A1—7 to 13 inches; very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular and some weak fine subangular blocky structure; friable; common fine and medium root channels; few wormcasts; moderately acid; gradual smooth boundary.

A2—13 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) with some pale brown (10YR 6/3) peds, dry; weak fine subangular

blocky structure; friable; common fine inped tubular pores and few medium root channels; pore fillings and wormcasts of brown (10YR 4/3); moderately acid; clear wavy boundary.

Bw1—18 to 26 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; weak and moderate fine subangular blocky structure; friable; common fine inped tubular pores; some oriented thin discontinuous very dark grayish brown (10YR 3/2) stains on a few peds; few black (10YR 2/1) fills in fine vertical channels; very few very fine soft dark brown concretions (iron oxides); slightly acid; gradual smooth boundary.

Bw2—26 to 34 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; very few light fine faint grayish brown (2.5Y 5/2) mottles in lower part; friable; many fine inped tubular pores; thin discontinuous clay films on some peds; few fine soft dark brown and yellowish brown concretions (iron oxides); slightly acid; clear smooth boundary.

Bw3—34 to 41 inches; yellowish brown (10YR 5/4) and brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; common fine faint grayish brown (2.5Y 5/2) and common fine faint yellowish brown (10YR 5/6) mottles with few fine faint brown (7.5YR 4/4) mottles in the lower part; friable; many fine inped tubular pores; thin discontinuous clay films on vertical faces of peds; fine soft dark brown and yellowish brown concretions (iron oxides); slightly acid; gradual smooth boundary.

Bw4—41 to 47 inches; mottled yellowish brown (10YR 5/4), grayish brown (2.5Y 5/2), and some brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; common fine faint yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; friable; many fine and medium inped tubular pores; few thin discontinuous films on some vertical faces; slight increase in grayish brown color in ped interiors; very few very fine soft black concretions (manganese oxides); slightly acid; gradual smooth boundary.

BC—47 to 58 inches; mottled yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2) silty clay loam with hue slightly yellower than 2.5Y; weak medium and coarse prismatic structure parting to weak medium subangular blocky; common fine faint yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; friable; many fine and medium inped tubular pores; very few very fine soft black concretions (manganese oxides); very few indistinct silt coats on a few vertical faces; slightly acid to neutral; diffuse smooth boundary.

C—58 to 68 inches; mottled yellowish brown (10YR 5/4) and olive gray (5Y 5/2) silty clay loam; massive with some vertical cleavage; friable; many fine and very fine tubular pores; few indistinct silt coats on vertical faces; few fine soft dark brown to black concretions (iron and manganese oxides); mottled oxidized and leached weathering zone; neutral; clear smooth boundary.

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: More than 120 inches; ranges to 72 inches
Depth to cambic horizon: 10 to 24 inches
Depth to the horizon with maximum clay content: Decreases with increasing slope gradient
Thickness of the solum: 40 to 70 inches
Thickness of the mollic epipedon: 10 to 24 inches
Particle-size control section (weighted average): Silty clay loam
Content of clay in the particle-size control section (weighted average): 27 to 34 percent
Content of sand in the particle-size control section (weighted average): Less than 10 percent; typically less than 5 percent and mostly very fine in size
Other features: A zone that lacks mottles is immediately below the A horizon and is at least 12 inches thick. Some very thin discontinuous clay films are evident on

vertical faces of peds in the Bw horizon, but the B/A clay ratio is only about 1:1. Grayish brown, yellowish brown, strong brown, and brown mottles are in the lower part of the B horizon and in the C horizon and increase in size and abundance with depth. The grayish colors are considered as relict mottles. Soils having dominantly 2 chroma below a depth of 40 inches are within the range of the series.

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2 (2 if value of 3)
Texture—silty clay loam or silt loam
Content of clay—25 to 35 percent
Reaction—moderately or slightly acid; some pedons have a neutral Ap horizon
Thickness of the horizon—10 to 24 inches

BA horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silty clay loam
Content of clay—27 to 34 percent
Reaction—moderately or slightly acid
Thickness of the horizon—2 to 6 inches
Special features—colors with value of 3 and chroma of 2 are present as coatings on faces of peds below the mollic epipedon in some pedons

Bw horizon:
Hue—10YR
Value—3 or 4 (upper part); 4 or 5 (lower part)
Chroma—3 (upper part); 3 or 4 (lower part)
Texture—silty clay loam
Content of clay—30 to 34 percent; ranges to 27 percent
Reaction—moderately or slightly acid
Thickness of the horizon—20 to 34 inches

BC and C horizons:
Hue—10YR to 5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Martin Series

The Martin series consists of deep and very deep, moderately well drained soils that formed in colluvium and/or residuum from interbedded silty and clayey shales, limestone, and clay beds. These soils are on uplands. Permeability is slow. Slopes range from 0 to 12 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 34 inches.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Martin silty clay loam, in a cultivated field about 4.2 miles southwest of Clinton, in Douglas County, Kansas; 1,440 feet north and 1,025 feet west of the southeast corner of sec. 31, T. 14 S., R. 18 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 9 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; hard, firm, slightly sticky and slightly plastic; slightly acid; gradual smooth boundary.

BA—9 to 14 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; most peds have shiny surfaces; medium acid; gradual smooth boundary.

Bt1—14 to 28 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; moderate medium and coarse subangular blocky with some angular blocky structure; very hard, very firm, very sticky and very plastic; distinct continuous clay films on faces of peds; few fine distinct yellowish brown (10YR 5/4) masses of iron accumulations; common fine black manganese concretions; many fine wormcasts; many root channels filled with black material; medium acid; gradual smooth boundary.

Bt2—28 to 37 inches; dark grayish brown (10YR 4/2) silty clay, olive brown (2.5Y 4/4) crushed, grayish brown (10YR 5/2) dry; moderate medium and coarse angular blocky with some subangular blocky structure; very hard, very firm, very sticky and very plastic; distinct and continuous clay films on faces of peds; few fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) masses of iron accumulations; common fine black manganese concretions; wormcasts and root channels as in horizon above; slightly acid; gradual smooth boundary.

BC—37 to 48 inches; grayish brown (10YR 5/2) silty clay, light brownish gray (10YR 6/2) dry; weak coarse and medium angular blocky and subangular blocky structure; very hard, very firm, very sticky and very plastic; clay films on faces of some peds; common coarse prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) masses of iron accumulations; some dark root channels; common fine black manganese concretions; neutral; diffuse boundary.

C—48 to 80 inches; coarsely mottled gray (10YR 5/1), strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and olive brown (2.5Y 4/4) silty clay; light gray (10YR 6/1), reddish yellow (7.5YR 6/6), brownish yellow (10YR 6/6), and light olive brown (2.5Y 5/4) dry; massive; very hard, very firm, very sticky and very plastic; few fine black manganese concretions; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 36 inches; includes the upper part of the argillic horizon

Carbonates: Generally do not have free carbonates; a few small carbonate concretions in the lower part of the B and C horizons in some pedons

Depth to shale or clay beds: More than 40 inches

Other features: A bedrock substratum phase is recognized.

A horizon:

Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay loam, silty clay, or clay loam
Reaction—moderately acid or slightly acid

Bt horizon:

Hue—10YR or 2.5Y
Value—2 to 4 moist, 3 to 5 dry
Chroma—1 or 2 (upper part); 1 to 4 (lower part)
Texture—clay or silty clay
Content of clay—40 to 55 percent
Reaction—moderately acid to slightly alkaline

Special features—strong brown, reddish brown, and yellowish brown iron accumulations are few and distinct (upper part); common and prominent (lower part)

C horizon:

Hue—5YR to 2.5Y
Texture—clay or silty clay
Reaction—neutral or slightly alkaline

Morrill Series

The Morrill series consists of very deep, well drained soils that formed in loamy glacial till or outwash deposits. These soils are on uplands. Slopes range from 1 to 30 percent. The mean annual precipitation is about 37 inches, and the mean annual temperature is about 53 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Morrill loam, in an area of grassland about 5 miles east and 2.5 miles north of Hiawatha, in Brown County, Kansas; 2,475 feet north and 630 feet west of the southeast corner of sec. 7, T. 2 S., R. 18 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; 2 percent mixed pebbles; very strongly acid; clear smooth boundary.

BA—6 to 12 inches; dark brown (10YR 3/3 and 7.5YR 3/4) loam, brown (10YR 4/3) dry; moderate medium granular structure; hard, firm, slightly sticky and slightly plastic; common fine roots; 2 percent mixed pebbles; strongly acid; gradual smooth boundary.

Bt1—12 to 22 inches; dark reddish brown (5YR 3/4) loam, strong brown (7.5YR 4/6) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; many faint discontinuous clay films on faces of peds; 2 percent mixed pebbles; moderately acid; gradual smooth boundary.

Bt2—22 to 30 inches; reddish brown (5YR 4/4) sandy clay loam, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure; hard, firm, sticky and slightly plastic; common fine roots; many faint discontinuous clay films on faces of peds; 2 percent mixed pebbles; moderately acid; gradual wavy boundary.

Bt3—30 to 35 inches; yellowish red (5YR 4/6) and brown (7.5YR 4/4) sandy clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common faint patchy clay films on faces of peds; 2 percent mixed pebbles; slightly acid; gradual wavy boundary.

Bt4—35 to 43 inches; brown (7.5YR 4/4) and strong brown (7.5YR 4/6) sandy clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few faint patchy clay films on faces of peds; few medium yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

BC—43 to 52 inches; strong brown (7.5YR 4/4) fine sandy loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common medium yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

2C1—52 to 59 inches; strong brown (7.5YR 4/6) fine sandy loam, reddish yellow (7.5YR 6/6) dry; massive; slightly hard, very friable, slightly sticky and nonplastic; many

fine yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

2C2—59 to 73 inches; strong brown (7.5YR 4/6) loamy fine sand, reddish yellow (7.5YR 6/6) dry; single grain; loose, nonsticky and nonplastic; common coarse strong brown (7.5YR 5/8) and yellowish red (5YR 5/6) relict iron stains; 2 percent mixed pebbles; slightly acid; gradual smooth boundary.

2C3—73 to 80 inches; strong brown (7.5YR 5/6) sand, reddish yellow (7.5YR 6/6) dry; single grain; loose, nonsticky and nonplastic; common coarse and very coarse rounded clay bodies throughout; 2 percent mixed pebbles; slightly acid.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 6 to 23 inches
Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: 30 to 60 inches
Content of clay in the particle-size control section (weighted average): 18 to 35 percent
Content of sand in the particle-size control section (weighted average): More than 20 percent
Other feature: A stony phase is recognized.

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 to 3
Texture—loam, clay loam, stony loam, or very stony loam
Content of clay—15 to 35 percent
Content of rock fragments—0 to 14 percent pebbles, by volume
Reaction—neutral to very strongly acid

Bt horizon:
Hue—7.5YR or 5YR
Value—3 or 4 moist, 4 or 5 dry
Chroma—3 to 6
Texture—loam, clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam
Content of clay—18 to 35 percent
Content of rock fragments—0 to 20 percent pebbles
Reaction—neutral to very strongly acid

2C or C horizons:
Hue—10YR, 7.5YR, or 5YR
Value—4 or 5 moist, 4 to 6 dry
Chroma—3 to 6
Texture—loam, clay loam, fine sandy loam, sandy loam, sandy clay loam, gravelly loam, gravelly clay loam, gravelly sandy loam, gravelly sandy clay loam, loamy fine sand, or sand; strata of clay in a few pedons
Content of clay—5 to 30 percent
Content of rock fragments—0 to 20 percent pebbles
Reaction—neutral to very strongly acid

Olmitz Series

The Olmitz series consists of deep, moderately well drained soils that formed in loamy local alluvium. These soils are on footslopes or alluvial fans. Permeability is

moderate. Slopes range from 2 to 14 percent. The mean annual temperature is about 51 degrees F, and the mean annual precipitation is about 32 inches.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Olmitz loam, on a southwest-facing slope of 3 percent, in an area of formerly cultivated pasture about 1 mile west and 7 miles north of Patterson, in Madison County, Iowa; 1,940 feet north and 740 feet east of the southwest corner of sec. 30, T. 77 N., R. 26 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) loam, very dark brown (10YR 2/2) kneaded, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; moderately acid; clear smooth boundary.

A1—7 to 15 inches; very dark brown (10YR 2/2) clay loam, grayish brown (10YR 5/2) dry; weak very fine and fine subangular blocky and moderate fine granular structure; friable; many wormcasts; common very fine tubular pores and root channels; moderately acid; gradual smooth boundary.

A2—15 to 23 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) kneaded, dark grayish brown to grayish brown (10YR 4/2 and 5/2) dry; moderate fine and very fine subangular blocky structure; friable; common very fine tubular pores and root channels; moderately acid; gradual smooth boundary.

A3—23 to 30 inches; very dark grayish brown (10YR 3/2) clay loam, some peds have very dark brown (10YR 2/2) organic coatings, very dark grayish brown (10YR 3/2) kneaded, dark grayish brown to grayish brown (10YR 4/2 and 5/2) dry; moderate fine subangular blocky structure with some very fine blocks; friable; common very fine tubular pores and root channels; an occasional gravel-size pebble 2 to 5 mm in diameter; moderately acid; gradual smooth boundary.

Bw1—30 to 41 inches; dark brown (10YR 3/3) clay loam, some peds have very dark grayish brown (10YR 3/2) organic coatings, brown (10YR 4/3) kneaded; weak coarse prismatic and weak coarse blocky structure that parts to weak very fine and fine subangular blocky; friable; common very fine tubular pores; a number of gravel-size pebbles 2 to 5 mm in diameter; slightly acid; gradual smooth boundary.

Bw2—41 to 48 inches; mostly dark brown (10YR 3/3) with some brown (10YR 4/3) clay loam, brown (10YR 4/3) kneaded; few fine faint yellowish brown (10YR 5/6) mottles; weak coarse prismatic and weak coarse blocky structure parting to weak very fine and fine subangular blocky; friable; a few fine dark concretions (oxides); few to common very fine tubular pores; slightly acid; gradual smooth boundary.

BC—48 to 60 inches; brown (10YR 4/3) clay loam; weak fine subangular blocky structure; friable; common very fine tubular pores; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 40 inches
Depth to redoximorphic concentrations: 41 to 60 inches
Depth to carbonates: More than 60 inches
Depth to glacial till: More than 60 inches
Content of clay in the particle-size control section (weighted average): 28 to 34 percent
Content of sand in the particle-size control section (weighted average): 20 to 50 percent

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam
Content of clay—18 to 34 percent
Content of rock fragments—0 to 5 percent

Reaction—moderately acid to neutral
Special features—up to 18 inches of recently deposited materials in some pedons

Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—clay loam
Content of clay—22 to 34 percent
Content of rock fragments—0 to 5 percent
Reaction—strongly acid to slightly acid
Special features—redoximorphic concentrations or depletions in the lower portion of the B horizon

BC horizon:
Hue—10YR
Value—4
Chroma—2 or 3
Texture—loam or clay loam
Content of clay—22 to 34 percent
Content of rock fragments—0 to 5 percent
Reaction—strongly acid to neutral
Special features—redoximorphic concentrations or depletions in the BC horizon
Thickness of the horizon—0 to 12 inches

Otoe Series

The Otoe series consists of very deep, moderately well drained soils that formed in loess over glacial till. These soils are on loess-covered glaciated uplands. Slopes range from 2 to 11 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 33 inches at the type location.

Taxonomic classification: Fine, smectitic, mesic Aquertic Hapludalfs

Typical Pedon

Otoe silty clay loam, on a convex, southwest-facing slope of 8 percent, in a cultivated field about 2 miles south and 3 miles west of Cortland, in Gage County, Nebraska; 2,250 feet south and 1,050 feet east of the northwest corner of sec. 21, T. 6 N., R. 6 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; silty clay loam, very dark grayish brown (10YR 3/2) crushed, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; hard, friable; common very fine and fine roots throughout; common very fine tubular pores; strongly acid; abrupt smooth boundary.

Bt1—6 to 15 inches; silty clay, 80 percent dark grayish brown (10YR 4/2) crushed, and 20 percent brown (10YR 5/3) crushed, grayish brown (10YR 5/2) and pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; very hard, firm; common very fine and fine roots throughout; many very fine tubular pores; continuous clay films on vertical and horizontal faces of peds and common very dark gray (10YR 3/1) organic coats on faces of peds and in pores; few fine irregular yellowish brown (10YR 5/6) soft masses of iron accumulation, few fine and medium rounded light gray (2.5Y 7/2) iron depletions, and few fine rounded masses of iron-manganese concretions; slightly acid; clear smooth boundary.

Bt2—15 to 22 inches; silty clay, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine roots between peds; many very

fine and fine tubular pores; continuous clay films on vertical and horizontal faces of peds and few faint very dark gray (10YR 3/1) organic coats; few fine irregular yellowish brown (10YR 5/6) soft masses of iron accumulation and few fine rounded soft masses of iron-manganese concretions; slightly acid; clear smooth boundary.

Bt3—22 to 32 inches; silty clay, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine roots in cracks; common fine tubular pores; continuous clay films on vertical and horizontal faces of peds; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation and common very coarse irregular gray (2.5Y 6/1) iron depletions; slightly acid; gradual wavy boundary.

BC—32 to 40 inches; silty clay loam, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; moderate medium subangular blocky structure; very hard, firm; common very fine roots in cracks; common fine tubular pores; patchy clay films on faces of peds; many medium and coarse irregular yellowish brown (10YR 5/8) soft masses of iron accumulation and common rounded soft masses of iron manganese concretions; slightly acid; gradual wavy boundary.

C1—40 to 50 inches; silty clay loam, gray (5Y 5/1) crushed, light gray (2.5Y 7/2) dry; massive; hard, friable; common fine roots in cracks; common fine tubular pores; common medium and coarse irregular yellowish brown (10YR 5/8) soft masses of iron accumulation and few coarse cylindrical iron concretions throughout; neutral; gradual wavy boundary

C2—50 to 57 inches; silty clay loam, brown (7.5YR 5/2) crushed, pinkish gray (7.5YR 6/2) dry; massive; hard, friable; common very fine roots in cracks; common fine tubular pores; many medium and coarse irregular yellowish brown (10YR 5/8) masses of iron accumulation and common rounded soft masses of iron-manganese concretions; neutral; gradual wavy boundary.

2C3—57 to 80 inches; clay loam, brown (7.5YR 4/3) crushed, brown (7.5YR 5/3) dry; massive; hard, friable; common very fine roots in cracks; common fine tubular pores; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation and common rounded soft masses of iron-manganese concretions; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March through May.
Mean annual soil temperature: 51 to 56 degrees F
Depth to argillic horizon: 3 to 7 inches
Depth to secondary calcium carbonate (if it occurs): 30 to 50 inches
Depth to redoximorphic concentrations: 3 to 7 inches
Depth to redoximorphic depletions: 3 to 7 inches
Depth to episaturation: 12 to 36 inches from March through May
Thickness of the solum: 18 to 53 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 3 to 32 inches.
Content of clay in the particle-size control section (weighted average): 35 to 55 percent
Content of sand in the particle-size control section (weighted average): 1 to 10 percent
Other features: Some pedons have a BC horizon.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—35 to 45 percent
Reaction—strongly acid to slightly acid

Bt horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 5, and chroma of 6 to 8
Redoximorphic depletions—hue of 10YR or 2.5Y, value of 5 or 6, and chroma of less than 2
Texture—silty clay or silty clay loam
Content of clay—35 to 55 percent
Reaction—moderately acid to neutral

C horizon:
Hue—7.5YR, 2.5Y, or 5Y
Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8
Texture—silty clay loam or silt loam
Content of clay—27 to 40 percent
Reaction—slightly acid to moderately alkaline

2C horizon (typically below a depth of 40 inches):
Hue—7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6
Redoximorphic concentrations—hue of 10YR, 7.5YR, or 5YR; value of 4 to 6; and chroma of 6 to 8
Texture—clay loam, silty clay loam, or clay
Content of clay—27 to 45 percent
Reaction—neutral or slightly alkaline

Padonia Series

The Padonia series consists of well drained soils that formed in loess. These soils are on uplands. They are moderately deep over clayey alluvium derived from calcareous shale. Slopes range from 3 to 25 percent. The mean annual precipitation is about 34 inches, and the mean annual air temperature is about 53 degrees F.

Taxonomic classification: Fine, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Padonia silty clay loam, on a slope of 6 percent, in an area of native pasture about 5 miles west and 4 miles north of Morrill, in Brown County, Kansas; 1,250 feet east and 400 feet north of the southwest corner of sec. 6, T. 1 S., R. 15 E. (Colors are for moist soil unless otherwise indicated.)

A1—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable, hard, sticky and plastic; common fine roots throughout; slightly acid; clear smooth boundary.

A2—6 to 11 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; weak fine subangular blocky structure; firm, very hard, sticky and plastic; common fine roots throughout; neutral; gradual smooth boundary.

Bt—11 to 22 inches; dark brown (10YR 4/3) silty clay, brown (10YR 5/3) dry; moderate fine subangular blocky structure; very firm, very hard, very sticky and very plastic;

few faint continuous clay films; few fine roots throughout; neutral; gradual smooth boundary.

Btk—22 to 32 inches; 70 percent dark yellowish brown (10YR 4/4) and 30 percent olive gray (5Y 4/2) silty clay, 70 percent yellowish brown (10YR 5/4) and 30 percent olive gray (5Y 5/2) dry; moderate fine subangular blocky structure; very firm, very hard, very sticky and very plastic; few faint continuous clay films; few fine roots throughout; few fine rounded carbonate nodules; slightly alkaline; gradual wavy boundary.

BCk—32 to 37 inches; olive gray (5Y 5/2) silty clay loam, light olive gray (5Y 6/2) dry; weak fine subangular blocky structure; firm, hard, sticky and plastic; few fine roots throughout; strong effervescence; few fine rounded carbonate nodules; moderately alkaline; gradual wavy boundary.

Cr—37 inches; light olive gray (5Y 6/2) dry, partially weathered, calcareous shale.

Range in Characteristics

Soil moisture regime: Udic
Depth to paralithic contact: 20 to 40 inches to calcareous shale
Depth to argillic horizon: 6 to 12 inches
Depth to secondary calcium carbonate: 12 to 24 inches
Thickness of the mollic epipedon: 7 to 20 inches
Content of clay in the particle-size control section (weighted average): 35 to 50 percent
Content of sand in the particle-size control section (weighted average): 2 to 15 percent
Other features: Carbonates occur in the form of concretions, films, or threads, but they occur only in the form of concretions at a depth of less than 28 inches. The wide range in color is considered to be inherent of the varicolored shale.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 to 3
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—dominantly slightly acid or neutral; slightly acid to strongly acid in areas of cropland

Bt horizon:
Hue—10YR (upper part); 2.5Y or 5Y (lower part)
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 6
Texture—silty clay, clay, or silty clay loam
Content of clay—35 to 50 percent
Reaction—slightly acid to slightly alkaline

Btk horizon:
Hue—2.5Y or 5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 6
Texture—silty clay, clay, or silty clay loam
Content of clay—35 to 50 percent
Reaction—slightly alkaline or moderately alkaline

BCk horizon (if it occurs):
Hue—2.5Y or 5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4, moist or dry
Texture—silty clay loam

Content of clay—27 to 40 percent
Reaction—slightly alkaline or moderately alkaline

Pawnee Series

The Pawnee series consists of very deep, moderately well drained soils that formed in glacial till. These soils are on uplands. Permeability is slow or very slow. Slopes range from 0 to 12 percent. The mean annual precipitation is about 30 inches, and the mean annual temperature is about 54 degrees F.

Taxonomic classification: Fine, smectitic, mesic Oxyaquic Vertic Argiudolls

Typical Pedon

Pawnee loam, in a cultivated area about 4 miles north of Pawnee City, in Pawnee County, Nebraska; 1,585 feet west and 350 feet south of the northeast corner of sec. 2, T. 2 N., R. 11 E.; Steinauer USGS topographic quadrangle; lat. 40 degrees 10 minutes 27 seconds N. and long. 96 degrees 08 minutes 05 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and very fine granular structure; many fine and medium and few coarse roots throughout; common fine tubular pores; slightly hard, friable; moderately acid; abrupt smooth boundary.

A—6 to 10 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; many fine and medium and few coarse roots throughout; common fine tubular pores; slightly hard, friable; moderately acid; clear smooth boundary.

BA—10 to 14 inches; dark brown (10YR 3/3) clay loam, dark yellowish brown (10YR 3/4) dry; moderate fine and medium subangular blocky structure; hard, friable; common fine and few medium roots throughout; common fine tubular pores; few fine prominent dark reddish brown (5YR 3/4) iron masses; moderately acid; gradual smooth boundary.

Bt1—14 to 24 inches; dark grayish brown (10YR 4/2) clay, brown (10YR 4/3) dry; moderate medium and coarse subangular blocky structure; extremely hard, very firm; common fine and few medium roots throughout; common fine tubular pores; thin continuous organic coatings on faces of peds; 2 percent gravel, by volume; few fine and medium prominent reddish brown (5YR 4/4) iron masses; slightly acid; gradual smooth boundary.

Bt2—24 to 32 inches; brown (10YR 4/3) clay, dark yellowish brown (10YR 4/4) dry; weak coarse subangular blocky structure; extremely hard, very firm; few fine and medium roots throughout; few fine tubular pores; thin continuous organic coatings on faces of peds; 2 percent gravel, by volume; common medium faint grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) and prominent reddish brown (5YR 5/4) iron masses; neutral; gradual smooth boundary.

Bt3—32 to 45 inches; olive brown (2.5Y 4/4) clay, light olive brown (2.5Y 5/4) dry; weak coarse subangular blocky structure; very hard, very firm; few fine and medium roots throughout; few fine tubular pores; thin patchy organic coatings on faces of peds; 2 percent gravel, by volume; many medium distinct grayish brown (10YR 5/2) and prominent brown (7.5YR 5/4) iron masses; moderately alkaline; gradual smooth boundary.

BC—45 to 53 inches; mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) clay, light olive brown (2.5Y 5/4) and dark yellowish brown (10YR 4/4) dry; weak medium subangular blocky structure; very hard, very firm; few fine and medium roots throughout; few fine tubular pores; few medium lime concretions; 2 percent

gravel, by volume; many medium prominent dark brown (7.5YR 4/4) iron masses; moderately alkaline; clear smooth boundary.

C—53 to 80 inches; grayish brown (2.5Y 5/2) clay loam, light olive brown (2.5Y 5/4) dry; massive; small iron and manganese concretions; 2 percent gravel, by volume; few medium and large soft masses of lime; many coarse distinct grayish brown (10YR 5/2) iron masses; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March through May.
Mean annual soil temperature: 51 to 56 degrees F
Depth to argillic horizon: 7 to 19 inches
Depth to secondary calcium carbonate: 29 to 54 inches
Depth to redoximorphic concentrations: 7 to 13 inches
Depth to episaturation: 12 to 36 inches from March through May
Thickness of the mollic epipedon: 10 to 19 inches; commonly includes the upper part of the B horizon
Thickness of the solum: 40 to 60 inches
Content of clay in the particle-size control section (weighted average): 40 to 48 percent
Content of sand in the particle-size control section (weighted average): 20 to 45 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 5 percent, by volume
Size of rock fragments in the particle-size control section: Gravel
Other features: Some pedons have a BA horizon.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—loam, clay loam, or clay
Content of clay—15 to 41 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5 moist, 3 to 6 dry
Chroma—2 to 4
Redoximorphic concentrations—hue of 7.5YR or 5YR, value of less than 5, and chroma of less than 6
Texture—clay
Content of clay—40 to 48 percent
Content of rock fragments—0 to 5 percent gravel
Reaction—slightly acid to moderately alkaline

BC horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6, moist or dry
Chroma—2 to 6
Redoximorphic concentrations—hue of 7.5YR or 5YR, value of less than 5, and chroma of less than 4
Texture—clay
Content of clay—40 to 48 percent
Content of rock fragments—0 to 5 percent gravel
Reaction—slightly alkaline or moderately alkaline

C horizon:

Hue—10YR, 2.5Y, 5Y, or N
Value—5 moist, 5 or 6 dry
Chroma—0 to 4
Redoximorphic concentrations—hue of 10YR, 7.5YR, or 5YR; value of less than 5; and chroma of less than 4
Texture—clay loam, sandy clay loam, or loam
Content of clay—15 to 40 percent
Content of rock fragments—0 to 5 percent, by volume
Reaction—slightly alkaline or moderately alkaline

Reading Series

The Reading series consists of very deep, well drained or moderately well drained soils that formed in silty alluvium. These soils are on flood-plain steps and stream terraces. Permeability is moderately slow. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 33 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Pachic Argiudolls

Typical Pedon

Reading silty clay loam, in a cultivated field 0.2 mile east of the Shawnee-Wabaunsee County line on Kansas Highway #4, in Shawnee County, Kansas; 1,200 feet east and 2,540 feet south of the northwest corner of sec. 35, T. 12 S., R. 13 E.; Dover USGS topographic quadrangle; lat. 38 degrees 57 minutes 53 seconds N. and long. 95 degrees 56 minutes 35 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; moderately acid; abrupt smooth boundary.

A—6 to 14 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; moderately acid; gradual smooth boundary.

Bt1—14 to 22 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; moderate fine subangular blocky and angular blocky structure; hard, firm, sticky and plastic; few distinct patchy continuous clay films on face of peds; moderately acid; gradual smooth boundary.

Bt2—22 to 40 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; moderate medium and fine subangular blocky and angular blocky structure; hard, firm, sticky and plastic; common distinct continuous clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt3—40 to 56 inches; dark yellowish brown (10YR 4/4) silty clay loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; hard, firm, sticky and plastic; few distinct patchy clay films on faces of peds; slightly acid; diffuse boundary.

C—56 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam, yellowish brown (10YR 5/4) dry; massive; hard, firm, sticky and plastic; neutral.

Range in Characteristics

Depth to argillic horizon: 10 to 20 inches
Depth to calcium carbonate: 40 to 80 inches
Thickness of the mollic epipedon: 16 to 34 inches

Depth to redoximorphic concentrations: 36 to 50 inches; dark yellowish brown iron-manganese concentrations in some pedons
Particle-size control section (weighted average): 14 to 34 inches
Content of clay in the particle-size control section (weighted average): 27 to 35 percent
Other features: Some pedons have a BC horizon.

A horizon:
Hue—10YR
Value—2 or 3 moist, 4 or 5 dry
Chroma—1 to 3
Texture—silt loam or silty clay loam
Content of clay—20 to 32 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 to 4
Texture—silty clay loam
Content of clay—27 to 35 percent
Reaction—moderately acid to slightly alkaline

BC horizon:
Hue—10YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4
Texture—silt loam or silty clay loam
Content of clay—18 to 35 percent
Reaction—moderately acid to slightly alkaline

C horizon:
Hue—10YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—1 to 4
Texture—silt loam or silty clay loam
Content of clay—18 to 35 percent
Calcium carbonate equivalent—0 to 5 percent
Reaction—moderately acid to moderately alkaline

Sibleyville Series

The Sibleyville series consists of moderately deep, well drained soils that formed in residuum derived from sandstone and silty and sandy shale. These soils are on uplands. Permeability is moderate. Slopes range from 1 to 12 percent. The mean annual precipitation is 33 inches, and the mean annual temperature is 55 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Sibleyville loam, in an area of grassland in Douglas County, Kansas, six miles east of Baldwin; 800 feet west and 60 feet north of the southeast corner of sec. 33, T. 14 S., R. 21 E. (Colors are for moist soil unless otherwise indicated.)

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; slightly hard, very friable; a few small sandstone fragments; slightly acid; gradual smooth boundary.
B2t—7 to 15 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate fine

and medium granular structure; slightly hard, very friable; thin clay films on faces of peds; few small sandstone fragments; medium acid; clear smooth boundary.

C—15 to 27 inches; yellowish brown (10YR 5/4) channery loam, light yellowish brown (10YR 6/4) dry; massive; slightly hard, friable; medium acid; abrupt irregular boundary.

Cr—27 to 60 inches; partially weathered yellowish brown fine grained sandstone.

Range in Characteristics

Thickness of the solum: 14 to 34 inches
Depth to sandstone or sandy and silty shale: 20 to 40 inches
Thickness of the mollic epipedon: 7 to 20 inches
Reaction: Strongly acid to neutral throughout
Content of coarse fragments: 0 to 10 percent, by volume, that range from 2 mm to 3 inches in diameter.
Other features: Some pedons have a B1 horizon.

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—2 or 3
Texture—loam, fine sandy loam, or clay loam
Reaction—neutral to medium acid

B2 horizon:
Hue—5YR, 7.5YR, or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 4
Texture—loam, clay loam, or sandy clay loam
Content of clay—20 to 35 percent

C horizon:
Hue—10YR, 7.5YR, or 5YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—3 to 6
Texture—loam, clay loam, fine sandy loam, sandy clay loam, channery loam, channery clay loam, or channery sandy clay loam

Sogn Series

The Sogn series consists of shallow and very shallow, somewhat excessively drained soils that formed in residuum derived from limestone. These soils are on uplands. Slopes range from 0 to 20 percent. The mean annual precipitation is about 32 inches, and the mean annual temperature is about 55 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplustolls

Typical Pedon

Sogn silty clay loam, in an area of rangeland about 10 miles east and 1 mile south of Junction City, in Geary County, Kansas; 300 feet east and 50 feet south of the northwest corner of sec. 15, T. 12 S., R. 7 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium granular structure; hard, friable; few fragments of weathered limestone in the lower 3 inches making up less than 15 percent of the soil volume; strong effervescence; moderately alkaline; abrupt smooth boundary.

R—9 inches; level-bedded, indurated limestone that has joints averaging about 18 inches apart and less than 1/4 inch wide; cracks are filled with dark colored soil.

Range in Characteristics

Soil moisture regime: Ustic bordering on Udic
Depth to lithic contact: 4 to 20 inches to limestone bedrock
Thickness of the mollic epipedon: 4 to 20 inches
Content of clay in the particle-size control section (weighted average): 20 to 35 percent
Content of sand in the particle-size control section (weighted average): 2 to 35 percent
Content of rock fragments in the particle-size control section (weighted average): Less than 35 percent
Size of rock fragments in the particle-size control section: Pebbles or channers
Kind of rock fragments in the particle-size control section: Limestone
Other features: Some pedons do not contain free carbonates above the bedrock; some pedons have an AC or C horizon, which has colors similar to those of the A horizon and is channery silt loam or channery silty clay loam.

A horizon:
Hue—7.5YR to 2.5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 to 3, dry or moist
Texture—silty clay loam, loam, silt loam, or clay loam
Content of clay—20 to 35 percent
Content of rock fragments—less than 35 percent
Reaction—slightly acid to moderately alkaline

Steinauer Series

The Steinauer series consists of very deep, well drained soils that formed in calcareous glacial till. These soils are on uplands. Permeability is moderately slow. Slopes range from 5 to 60 percent. The mean annual temperature is about 52 degrees F, and the mean annual precipitation is about 28 inches.

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Typic Udorthents

Typical Pedon

Steinauer clay loam, on a convex, east-facing slope of 9 percent, in a pasture about 3 miles south and 0.5 mile west of Garland, in Seward County, Nebraska; 1,050 feet south and 2,375 feet west of the northeast corner of sec. 29, T. 11 N., R. 4 E.; Garland USGS topographic quadrangle; lat. 40 degrees 53 minutes 54 seconds N. and long. 96 degrees 59 minutes 42 seconds W. When described, the soil was moist to a depth of 41 inches. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable; common fine and medium roots; common fine and medium tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.
AC—6 to 15 inches; gray (10YR 5/1) clay loam, light gray (10YR 6/1) dry; weak coarse and medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm; common fine and medium roots; common fine and medium tubular pores; violent effervescence; moderately alkaline; clear smooth boundary.
C1—15 to 41 inches; grayish brown (10YR 5/2) clay loam, light brownish gray (10YR 6/2) dry; massive with common medium or strong angular planes of cleavage; hard, firm; few fine roots and tubular pores; many iron and manganese concretions; many

fine and medium pockets or seams of soft lime; violent effervescence; many coarse prominent reddish brown (5YR 4/4) iron masses in the matrix, which are relict redoximorphic features; moderately alkaline; diffuse smooth boundary.

C2—41 to 60 inches; yellowish brown (10YR 5/4) clay loam, light yellowish brown (10YR 6/4) dry; massive with many medium angular planes of cleavage; hard, firm; few fine roots and tubular pores; many iron and manganese concretions; common medium pockets or seams of soft lime; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 56 degrees F
Depth to secondary calcium carbonate: 0 to 10 inches
Thickness of the solum: 4 to 21 inches
Content of clay in the particle-size control section (weighted average): 24 to 35 percent
Content of sand in the particle-size control section (weighted average): 20 to 52 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 10 percent, by volume
Size of rock fragments in the particle-size control section: Gravel or cobbles
Kind of rock fragments in the particle-size control section: Mixed

A horizon:
Hue—10YR
Value—2 to 5 moist, 3 to 6 dry
Chroma—1 or 2
Texture—clay loam or loam
Content of clay—16 to 32 percent
Content of rock fragments—0 to 10 percent, by volume
Reaction—slightly alkaline or moderately alkaline

AC horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5 moist, 5 or 6 dry
Chroma—1 to 4
Texture—clay loam or loam
Content of clay—24 to 35 percent
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 moist, 6 or 7 dry
Chroma—2 to 4
Texture—clay loam or loam
Content of clay—24 to 35 percent
Content of rock fragments—0 to 10 percent, by volume, gravel, cobbles, or stones
Reaction—slightly alkaline or moderately alkaline

Vinland Series

The Vinland series consists of shallow over shale, somewhat excessively drained soils that formed in residuum derived from interbedded sandy and silty shales. These soils are on uplands. Permeability is moderate. Slopes range from 4 to 30 percent.

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Typic Hapludolls

Typical Pedon

Vinland silty clay loam, in an area of native grassland about 25 miles southwest of Topeka, in Shawnee County, Kansas; 225 feet west and 2,400 feet north of the southeast corner of sec. 32, T. 13 S., R. 14 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium and fine granular structure; hard, friable; slightly acid; gradual smooth boundary.

Bw—6 to 11 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine and medium subangular blocky structure; hard, friable; few small fragments of shale; slightly acid; gradual smooth boundary.

C—11 to 16 inches; dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silty clay loam, pale brown (10YR 6/3) and yellowish brown (10YR 5/4) dry; massive; hard, friable; many small shale fragments; slightly acid; clear wavy boundary.

Cr—16 to 24 inches; weathered, interbedded sandy and silty shale.

Range in Characteristics

Thickness of the solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches
Thickness of the mollic epipedon: 7 to 15 inches
Reaction: Medium acid to mildly alkaline
Texture: Fine sandy loam, loam, silt loam, or silty clay loam
Volume of rock fragments 0 to 3 inches in diameter in the particle-size control section: 0 to 15 percent

A horizon:
Hue—7.5YR or 10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2

Bw horizon:
Hue—7.5YR to 5Y
Value—2 to 5 moist, 3 to 6 dry
Chroma—2 to 4

C horizon:
Hue—7.5YR to 5Y
Value—4 to 7 moist, 5 to 8 dry
Chroma—2 to 4
Texture—fine sandy loam, loam, silt loam, or silty clay loam; includes shaly counterparts

Wabash Series

The Wabash series consists of very deep, poorly and very poorly drained soils that formed in alluvium. These soils are on flood plains. Permeability is very slow. Slopes range from 0 to 2 percent. The mean annual temperature is 53 degrees F, and the mean annual precipitation is 36 inches.

Taxonomic classification: Fine, smectitic, mesic Cumulic Vertic Endoaquolls

Typical Pedon

Wabash silty clay, on a slope of 0.5 percent, in a cultivated field about 4 miles south of Utica on the east side of Missouri State Highway “C”, in Livingston County, Missouri;

2,620 feet south and 20 feet east of the northwest corner of sec. 7, T. 56 N., R. 24 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay, dark grayish brown (10YR 4/2) dry; weak and moderate fine granular structure; firm; few fine faint dark gray (10YR 4/1) iron depletions; few fine black concretions (oxides); moderately acid; abrupt smooth boundary.

A1—6 to 9 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; strong fine and medium subangular blocky structure; firm; few fine faint dark gray (10YR 4/1) iron depletions; few fine black concretions (oxides); moderately acid; clear smooth boundary.

A2—9 to 19 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; very firm; few pressure faces; few fine distinct dark yellowish brown (10YR 4/4) iron masses; many fine concretions (oxides); slightly acid; gradual smooth boundary.

Bg1—19 to 38 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; some large spots and streaks of dark gray (5Y 4/1); moderate fine subangular blocky structure; very firm; common pressure faces; common coarse distinct dark yellowish brown (10YR 4/4) iron masses; many fine concretions (oxides); some exteriors of peds are very dark gray (N 3/0); slightly acid; diffuse smooth boundary.

Bg2—38 to 60 inches; dark gray (N 4/0) silty clay; large spots and streaks of gray (5Y 4/1); weak fine subangular blocky structure; common pressure faces; extremely firm; many fine concretions (oxides); slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 36 to 44 inches
Depth to carbonates: More than 40 inches
Depth to redoximorphic concentrations: 0 to 9 inches
Content of clay in the particle-size control section (weighted average): 40 to 60 percent
Content of sand in the particle size-control section (weighted average): Less than 15 percent
Content of rock fragments: None

A horizon:
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—less than 5 percent
Reaction—strongly acid to neutral

A horizon (overwash phase):
Hue—10YR to 5Y
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—20 to 40 percent
Content of sand—5 to 20 percent
Reaction—strongly acid to neutral
Thickness of the horizon—6 to 20 inches

Bg horizon:
Hue—10YR to 5Y or N
Value—2 to 5

Chroma—0 to 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—less than 15 percent
Reaction—strongly acid to neutral

Cg horizon (if it occurs):
Hue—10YR to 5Y or N
Value—2 to 5
Chroma—0 to 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—less than 15 percent
Reaction—strongly acid to slightly alkaline

Wamego Series

The Wamego series consists of moderately deep, well drained soils that formed in residuum from interbedded sandy and silty shale. These soils are on uplands. Permeability is slow. Slopes range from 3 to 25 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 32 inches.

Taxonomic classification: Fine, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Wamego silt loam, on a slope of 8 percent, in an area of native grass about 10 miles east of Westmoreland, in Pottawatomie County, Kansas; about 1,100 feet east and 400 feet south of the northwest corner of sec. 5, T. 8 S., R. 11 E. (Colors are for moist soil unless otherwise indicated.)

A—0 to 6 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly acid; clear smooth boundary.
AB—6 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly acid; clear smooth boundary.
Bt1—10 to 17 inches; dark brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; hard, friable; some faces of peds are very dark grayish brown (10YR 3/2); few faint clay films on ped faces; 5 percent gravel, mostly sandstone; common fine roots; slightly acid; gradual smooth boundary.
Bt2—17 to 27 inches; yellowish brown (10YR 5/4) silty clay loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; hard, friable; some faces of peds are dark brown (10YR 4/3); common fine faint clay films on ped faces; 10 percent gravel, mostly sandstone and shale; few fine roots; slightly acid; clear smooth boundary.
Cr—27 to 48 inches; pale brown and yellowish brown shale.

Range in Characteristics

Depth to paralithic contact: 20 to 40 inches to shale bedrock
Thickness of the mollic epipedon: 7 to 18 inches
Content of shale and sandstone gravel 2 mm to 3 inches long in the particle-size control section: 0 to 15 percent
Other features: Fine mica flakes are common throughout many pedons. Some pedons have a BC horizon with color and texture similar to the Bt horizon.

A horizon:

Hue—7.5YR or 10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—moderately acid or slightly acid

Bt horizon:

Hue—5YR to 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Texture—silty clay loam, clay loam, or silty clay
Content of clay—35 to 42 percent
Reaction—moderately acid to neutral
Content of rock fragments—0 to 35 percent shale and sandstone gravel

Wymore Series

The Wymore series consists of very deep, moderately well drained soils that formed in loess. These soils are on uplands. Permeability is slow or very slow. Slopes range from 0 to 9 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 33 inches near the type location.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Wymore silty clay loam, on a convex, southwest-facing slope of 4 percent, in a cultivated field about 1 mile east and 1 mile south of Pawnee City, in Pawnee County, Nebraska; 1,170 feet west and 580 feet south of the northeast corner of sec. 1, T. 1 N., R. 11 E. When it was described, the soil was moist throughout. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; weak medium granular structure; slightly hard, friable; moderately acid; abrupt smooth boundary.

BA—5 to 9 inches; very dark brown (10YR 2/2) silty clay, very dark grayish brown (10YR 3/2) dry; moderate very fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt1—9 to 17 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; moderate medium and fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; moderately acid; clear smooth boundary.

Bt2—17 to 25 inches; dark grayish brown (10YR 4/2) silty clay, dark yellowish brown (10YR 4/4) dry; moderate medium and fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; few fine distinct reddish brown (5YR 5/4) and dark yellowish brown (10YR 4/4) iron masses; slightly acid; gradual smooth boundary.

Bt3—25 to 32 inches; grayish brown (2.5Y 5/2) silty clay, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; common fine distinct dark yellowish brown (10YR 4/4) iron masses; slightly acid; clear smooth boundary.

BC—32 to 40 inches; mixed olive brown (2.5Y 4/4) and grayish brown (2.5Y 5/2) silty clay loam, grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) dry; moderate medium and fine subangular blocky structure; slightly hard, friable; thin

discontinuous clay films on faces of peds; common fine reddish brown (5YR 4/4) iron and manganese concretions; few fine distinct yellowish brown (10YR 5/4) iron masses; neutral; clear smooth boundary.

C—40 to 53 inches; gray (5Y 5/1) silty clay loam, light brownish gray (2.5Y 6/2) dry; weak medium and coarse subangular blocky structure; slightly hard, friable; few fine pipelike iron concretions; few lime concretions; neutral; abrupt smooth lower boundary.

Ab—53 to 63 inches; dark brown (7.5YR 4/2) silty clay loam, brown (10YR 5/3) dry; weak thin platy structure; soft, very friable; neutral.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March through April.
Mean annual soil temperature: 50 to 59 degrees F
Depth to argillic horizon: 4 to 15 inches
Depth to secondary calcium carbonate (if it occurs): 30 to 50 inches
Depth to redoximorphic concentrations: 12 to 24 inches
Depth to episaturation: 12 to 36 inches from March through April
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the solum: 33 to 80 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 4 to 39 inches
Content of clay in the particle-size control section (weighted average): 42 to 55 percent
Content of sand in the particle-size control section (weighted average): 0 to 5 percent
Other features: Redoximorphic features in the form of iron masses and iron and manganese concretions with hue of 5YR, 7.5YR, or 10YR; value of 2 to 5; and chroma of 1 to 8 are in the lower part of the particle-size control section and underlying layers.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—27 to 50 percent
Reaction—moderately acid or slightly acid

Bt horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Texture—silty clay
Content of clay—42 to 55 percent
Reaction—moderately acid to neutral
Special features—redoximorphic features are not evident or are masked by the matrix color in the lower part of the Bt horizon in some pedons

C horizon:
Hue—2.5Y or 5Y
Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—neutral or slightly alkaline

Zook Series

The Zook series consists of very deep, poorly drained soils that formed in alluvium. These soils are on flood plains, upland drainageways, and stream terraces. Slopes range from 0 to 5 percent. The mean annual temperature is about 49 degrees F, and the mean annual precipitation is about 31 inches.

Taxonomic classification: Fine, smectitic, mesic Cumulic Vertic Endoaquolls

Typical Pedon

Zook silty clay loam, on a slope of less than 1 percent, in a cultivated field, at an elevation of 1,150 feet above sea level about 5 miles west of Atlantic, in Cass County, Iowa; about 2,040 feet east and 210 feet north of the southwest corner of sec. 5, T. 76 N., R. 37 W.; Walnut USGS topographic quadrangle; lat. 41 degrees 23 minutes 46 seconds N. and long. 95 degrees 07 minutes 44 seconds W., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular and weak fine subangular blocky structure; friable; slightly compact at 6 inches; many fine roots; moderately acid; clear smooth boundary.

A1—6 to 14 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

A2—14 to 20 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; friable; sheen on faces of peds; slightly acid; gradual smooth boundary.

A3—20 to 38 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; faces of peds black (10YR 2/1); moderate medium subangular blocky structure; firm; sheen on faces of peds; slightly acid; gradual smooth boundary.

Bg—38 to 52 inches; dark gray (5Y 4/1) and very dark gray (10YR 3/1) silty clay; moderate medium subangular blocky structure; firm; sheen on faces of peds; few fine dark concretions; slightly acid; gradual smooth boundary.

Cg—52 to 60 inches; dark gray (5Y 4/1) silty clay in the upper part, gray (5Y 5/1) in the lower part; massive, some vertical cleavage; firm; few dark concretions; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 36 to more than 60 inches
Depth to redoximorphic concentrations: 24 to 60 inches
Depth to carbonates: 60 to more than 80 inches
Content of clay in the particle-size control section (weighted average): 35 to 44 percent
Content of sand in the particle-size control section (weighted average): 0 to 15 percent fine and coarser sand
Other features: These soils do not have stratification above a depth of 4 feet.

Ap and A horizons:
Hue—10YR or N; 10YR (overwash)
Value—2 or 3; 2 or 3 (overwash)
Chroma—0 or 1; 1 or 2 (overwash)
Texture—silty clay loam or silty clay; silt loam (overwash)
Content of clay—32 to 45 percent; 20 to 26 percent (overwash)
Content of sand—less than 15 percent; 5 to 20 percent (overwash)
Reaction—moderately acid to slightly alkaline
Thickness of the horizon—6 to 18 inches (overwash)

Special features—matrix value of 3 or lower extends to a depth of more than 36 inches

Bg horizon:

Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam or silty clay
Content of clay—36 to 45 percent
Content of sand—less than 15 percent
Reaction—slightly acid or neutral

Cg horizon:

Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam, silty clay, or silt loam
Content of clay—20 to 45 percent
Content of sand—less than 15 percent
Reaction—slightly acid or neutral

Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation.

The characteristics of the soil at any given place are determined by the interaction among five factors of soil formation—climate, plant and animal life, parent material, relief, and time. Each of these factors affects the formation of every soil, and each modifies the effects of the other four factors. The effects of each vary from location to location. The interactions among the factors are more complex for some soils than for others.

Climate and vegetation act on the parent material and gradually change it to a natural body of soil. Relief modifies the effects of climate and vegetation, mainly through its effect on runoff and temperature. The nature of the parent material also affects the kind of soil that forms. Time is needed for changing the parent material into a soil. Generally, a long period is needed for the formation of distinct horizons.

Parent Material

Parent material is the weathered rock or partly weathered material in which soils form. It affects texture, structure, color, natural fertility, and many other soil properties. The soils in Nemaha County formed in alluvium, glacial till, loess, and residuum of shale, sandstone, and thin strata of limestone.

Alluvium is sediment deposited by floodwater in stream valleys. Calco, Chase, Kennebec, Olmitz, Reading, and Wabash soils formed in these deposits.

Kansan glacial till covers many of the uplands in the county. It is a fine earth mixture of silt, sand, and clay left by glaciers. It contains pebbles and a few stones or boulders. It also has pockets of sand and gravel in a few places. Burchard, Morrill, Pawnee, and Steinauer soils formed in glacial till.

Loess is silty windborne material that is sometimes carried hundreds of miles from its source. Peorian Loess of the Wisconsin Stage was deposited during the Pleistocene era. Wymore soils formed in this material.

Upper Pennsylvanian and Lower Permian bedrock crops out in the county. It is sandstone and shale and thin strata of limestone. Benfield, Elmont, Kipson, Sibleyville, and Vinland variant soils formed in residuum of these rocks.

Climate

Climate is an active factor of soil formation. It directly affects the formation of a soil by weathering the parent material. It indirectly affects soil formation through its effect on the plants and animals on or in the soil.

The climate of Nemaha County is continental. It is characterized by intermittent dry and moist periods. These periods can last for less than a year or for several years. The soil dries to varying depths during dry periods. It slowly regains moisture during wet periods and can become so saturated that excess moisture penetrates the substratum. The accumulation of soft lime in the substratum of Burchard soils is evidence of this excess moisture. As a result of this wetting and drying, some of the

basic nutrients, and even clay particles, have been leached from the upper horizons of some soils.

Plant and Animal Life

Plants generally affect the content of nutrients and of organic matter in the soil and the color of the surface. Earthworms, cicadas, burrowing animals, and other animals help to keep the soil open and porous. Earthworms have left wormcasts in some soils. Bacteria and fungi help to decompose the plants, thus releasing plant nutrients.

The mid and tall prairie grasses have affected soil formation in Nemaha County more significantly than other forms of plant and animal life. As a result of the grasses, the upper part of a typical soil in the county is dark and is high in content of organic matter. The next part in many areas is slightly finer textured and somewhat lighter colored than the layer above. The underlying parent material generally is light in color and high in content of lime.

Relief

Relief affects soil formation through its effect on drainage, runoff, plant cover, and soil temperature. The soil temperature, for example, is slightly lower on east- and north-facing slopes than on west- and south-facing slopes. Most important is the effect of relief on the movement of water on the surface and into the soil.

The runoff rate is higher on the steeper soils in the uplands than on the less steep soils. As a result, erosion is more extensive. Relief has retarded the formation of Kipson soils, which formed in old parent material. Runoff is rapid on these moderately sloping to moderately steep soils, and much of the soil material is removed as soon as the soil forms.

Soils having distinct horizons generally formed in the less sloping areas, where runoff is slow. The nearly level Reading soils on stream terraces, for example, formed in the younger parent material in the county but have distinct horizons. Most of the precipitation received by these soils penetrates the surface.

Time

Differences in the length of time that the parent materials have been in place commonly are reflected in the degree of profile development. The soils in Nemaha County range from immature to mature. Those in low areas on bottom land, such as Kennebec soils, are subject to stream overflow. They receive new sediment with each flood. They have a thick, dark surface layer, but they have weakly expressed horizons. As a result, they are considered immature. Clay has accumulated in the subsoil of mature soils. Examples are Wymore and Pawnee soils.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness

of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building

up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings, and other structures, and plant roots.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other

material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a

similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic*

(vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth’s surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Centralia, Kansas)

Month	Temperature			Precipitation				
					30% chance will have		Avg. # of days w/.1 or more	Avg. total snow-fall
	Avg. daily max.	Avg. daily min.	Avg.	Avg.	Less than	More than		
	°F	°F	°F	In	In	In		In
January	36.0	16.2	26.1	0.88	0.45	1.27	2	8.9
February	42.8	21.4	32.1	1.03	0.50	1.47	2	7.3
March	54.3	31.2	42.7	2.58	1.30	3.19	4	5.9
April	65.6	41.6	53.6	3.20	2.05	3.69	5	1.7
May	75.1	52.1	63.6	4.64	2.92	5.82	7	0.0
June	84.5	61.7	73.1	4.62	2.96	5.24	6	0.0
July	89.5	66.6	78.0	4.71	2.16	6.34	6	0.0
August	88.0	64.7	76.3	3.75	2.30	4.70	5	0.0
September	80.0	55.9	67.9	3.94	2.14	4.72	5	0.0
October	68.5	44.2	56.4	2.64	1.39	3.61	4	0.6
November	51.3	31.3	41.3	2.15	1.07	2.99	4	3.2
December	39.4	20.6	30.0	1.07	0.42	1.30	2	7.1
Annual	---	---	---	---	30.25	39.62	--	---
Average	64.6	42.3	53.4	---	---	---	--	---
Total	---	---	---	35.21	---	---	52	34.6

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Centralia, Kansas)

Probability	Temperature		
	$24^{o}F$ or lower	$28^{o}F$ or lower	$32^{o}F$ or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 15	Apr. 25	May 7
2 year in 10 later than--	Apr. 10	Apr. 20	May 2
5 year in 10 later than--	Mar. 30	Apr. 9	Apr. 23
First freezing temperature in fall:			
1 yr in 10 earlier than--	Oct. 20	Oct. 9	Sept. 29
2 yr in 10 earlier than--	Oct. 25	Oct. 14	Oct. 3
5 yr in 10 earlier than--	Nov. 4	Oct. 23	Oct. 12

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Centralia, Kansas)

Probability	Temperature		
	24^{o} F or higher	28^{o} F or higher	32^{o} F or higher
	Beginning and ending dates growing season length		
50 percent *	3/28 to 11/3 220 days	4/7 to 10/21 197 days	4/21 to 10/10 172 days
70 percent *	3/23 to 11/8 230 days	4/2 to 10/25 206 days	4/17 to 10/14 179 days

* Percent chance of the growing season occurring between the beginning and ending dates.

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
4020	Chase silty clay loam, occasionally flooded	2,104	0.5
4525	Benfield silty clay loam, 3 to 7 percent slopes	4,352	0.9
4590	Clime-Sogn complex, 3 to 20 percent slopes	165	*
4710	Kipson silty clay loam, 5 to 30 percent slopes	8,736	1.9
4725	Kipson-Sogn complex, 5 to 30 percent slopes	223	*
4830	Wamego silt loam, 3 to 7 percent slopes	9	*
4831	Wamego silt loam, 7 to 20 percent slopes	37	*
7010	Calco silty clay loam, frequently flooded	499	0.1
7050	Kennebec silt loam, occasionally flooded	51,392	11.2
7051	Kennebec silt loam, frequently flooded	1,558	0.3
7090	Wabash silty clay loam, occasionally flooded	6,674	1.4
7170	Reading silt loam, rarely flooded	2,360	0.5
7171	Reading silt loam, moderately wet, rarely flooded	3	*
7206	Aksarben silty clay loam, 2 to 5 percent slopes	118	*
7207	Aksarben silty clay loam, 5 to 11 percent slopes	104	*
7220	Burchard clay loam, 6 to 12 percent slopes	1,784	0.4
7224	Burchard-Steinauer clay loams, 6 to 12 percent slopes	99,765	21.7
7225	Burchard-Steinauer clay loams, 12 to 18 percent slopes	9	*
7233	Elmont silt loam, 3 to 7 percent slopes	1,756	0.4
7301	Martin silty clay loam, 1 to 3 percent slopes	2	*
7424	Morrill clay loam, 3 to 7 percent slopes, eroded	627	0.1
7433	Morrill loam, 3 to 7 percent slopes	1,736	0.4
7435	Morrill loam, 7 to 12 percent slopes	1	*
7436	Morrill loam, 7 to 12 percent slopes, eroded	16	*
7455	Olmitz loam, 1 to 5 percent slopes	4,974	1.1
7470	Padonia-Martin silty clay loams, 5 to 9 percent slopes	2,010	0.4
7500	Pawnee clay loam, 1 to 3 percent slopes	66,076	14.3
7502	Pawnee clay loam, 3 to 7 percent slopes	28,075	6.1
7510	Pawnee clay, 3 to 7 percent slopes, eroded	100,776	21.9
7603	Sibleyville loam, 3 to 7 percent slopes	420	*
7608	Steinauer clay loam, 12 to 25 percent slopes	3,874	0.8
7656	Vinland variant loam, 5 to 25 percent slopes	475	0.1
7681	Wymore silty clay loam, 1 to 3 percent slopes	42,322	9.2
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded	2,362	0.5
7688	Wymore-Baileyville complex, 3 to 6 percent slopes, eroded	23,090	5.0
7851	Judson silt loam, 1 to 5 percent slopes	83	*
9971	Arents, earthen dam	78	*
9983	Gravel pits and quarries	179	*
9986	Miscellaneous water	50	*
9999	Water	1,600	0.3
	Total	460,474	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
4020:						
Chase	2w	---	---	75	---	41
4525:						
Benfield	4e	---	---	52	---	29
4590:						
Clime	6e	---	---	---	---	---
Sogn	6s	---	---	---	---	---
4710:						
Kipson	6e	---	---	---	---	---
4725:						
Kipson	6e	---	---	---	---	---
4830:						
Wamego	4e	---	---	60	---	35
4831:						
Wamego	6e	---	---	---	---	---
7010:						
Calco	5w	---	---	---	---	---
7050:						
Kennebec	2w	---	162	---	54	---
7051:						
Kennebec	5w	---	---	80	---	43
7090:						
Wabash	3w	---	96	88	35	36
7170:						
Reading	1	5.6	74	82	35	47
7171:						
Reading	1	5.9	150	111	43	49
7206:						
Aksarben	2e	5.8	146	107	42	47
7207:						
Aksarben	3e	5.6	142	104	41	45
7220:						
Burchard	3e	4.7	120	88	35	38
7224:						
Burchard	3e	---	---	64	---	36
Steinauer	4e	---	---	47	---	28

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
7225:						
Burchard	6e	---	---	---	---	---
Steinauer	6e	---	---	---	---	---
7233:						
Elmont	3e	---	---	70	---	39
7301:						
Martin	2e	5.3	131	97	38	43
7424:						
Morrill, eroded	3e	---	---	63	---	35
7433:						
Morrill	3e	---	---	67	---	37
7435:						
Morrill	3e	3.5	81	77	30	31
7436:						
Morrill, eroded	4e	4.8	122	90	35	40
7455:						
Olmitz	2e	---	---	75	---	42
7470:						
Padonia	4e	4.2	95	71	27	31
Martin	4e	5.2	128	95	37	42
7500:						
Pawnee	2e	---	---	62	---	34
7502:						
Pawnee	3e	---	---	56	---	31
7510:						
Pawnee, eroded	4e	---	---	50	---	28
7603:						
Sibleyville	3e	---	---	62	---	35
7608:						
Steinauer	6e	---	---	40	---	21
7656:						
Vinland variant	6e	---	---	---	---	---
7681:						
Wymore	2e	---	---	66	---	37
7684:						
Wymore	3e	4.0	81	86	30	36
7688:						
Wymore	3e	---	---	66	---	37
Baileyville	3e	---	---	60	---	33
7851:						
Judson	2e	6.1	154	113	44	51

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
9971:						
Arents, earthen dam	8	---	---	---	---	---
9983.						
Gravel pits and quarries						
9986.						
Miscellaneous water						
9999.						
Water						

Table 6.--Prime Farmland

(If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
4020	Chase silty clay loam, occasionally flooded
4830	Wamego silt loam, 3 to 7 percent slopes
7050	Kennebec silt loam, occasionally flooded
7090	Wabash silty clay loam, occasionally flooded (where drained)
7170	Reading silt loam, rarely flooded
7171	Reading silt loam, moderately wet, rarely flooded
7206	Aksarben silty clay loam, 2 to 5 percent slopes
7233	Elmont silt loam, 3 to 7 percent slopes
7301	Martin silty clay loam, 1 to 3 percent slopes
7433	Morrill loam, 3 to 7 percent slopes
7455	Olmitz loam, 1 to 5 percent slopes
7500	Pawnee clay loam, 1 to 3 percent slopes
7681	Wymore silty clay loam, 1 to 3 percent slopes
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded
7851	Judson silt loam, 1 to 5 percent slopes

Table 7.--Rangeland Productivity and Characteristic Plant Communities

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
4020:						
Chase	Loamy Lowland (pe30-37)	10,000	8,500	6,000	big bluestem	40
					yellow Indiangrass	25
					eastern gamagrass	15
					prairie cordgrass	10
					switchgrass	10
					Canada wildrye	5
					Florida paspalum	5
					longstem spikesedge	5
					marsh muhly	5
					tall dropseed	5
					Virginia wildrye	5
					yellow bristlegrass	5
4525:						
Benfield	Loamy Upland (pe30-37)	6,000	4,500	3,000	big bluestem	40
					little bluestem	25
					yellow Indiangrass	15
					eastern gamagrass	10
					switchgrass	10
					porcupinegrass	5
4590:						
Clime	Limy Upland (pe30-37)	5,000	3,500	2,500	big bluestem	35
					little bluestem	25
					sideoats grama	10
					switchgrass	10
					yellow Indiangrass	10
Sogn	Shallow Limy (pe30-37)	3,500	2,500	1,500	sideoats grama	30
					little bluestem	15
					big bluestem	10
					switchgrass	10
					yellow Indiangrass	10
4710:						
Kipson	Limy Upland (pe30-37)	4,500	3,500	2,000	big bluestem	35
					little bluestem	25
					sideoats grama	10
					switchgrass	10
					yellow Indiangrass	10
4725:						
Kipson	Limy Upland (pe30-37)	4,500	3,900	3,400	big bluestem	35
					little bluestem	25
					sideoats grama	10
					switchgrass	10
					yellow Indiangrass	10
Sogn	Shallow Limy (pe30-37)	3,500	2,500	1,500	sideoats grama	30
					little bluestem	15
					big bluestem	10
					switchgrass	10
					yellow Indiangrass	10

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
4830:						
Wamego-----------	Loamy Upland (pe30-36)	6,000	4,500	3,500	big bluestem-------------------	45
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
4831:						
Wamego-----------	Loamy Upland (pe30-36)	6,000	4,500	3,500	big bluestem-------------------	45
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
7010:						
Calco------------	Loamy Lowland (pe30-37)	6,300	6,000	5,800	reedgrass----------------------	25
					other perennial grasslikes-----	15
					miscellaneous perennial grasses	10
					slender wheatgrass-------------	10
					miscellaneous perennial forbs--	5
					plains bluegrass---------------	5
7050:						
Kennebec---------	Loamy Lowland (pe30-37)	10,000	8,000	6,000	miscellaneous perennial forbs--	10
					miscellaneous perennial grasses	10
					miscellaneous trees------------	10
					switchgrass--------------------	10
					yellow Indiangrass-------------	10
					little bluestem----------------	5
7051:						
Kennebec---------	Loamy Lowland (pe30-37)	10,000	8,000	6,000	big bluestem-------------------	40
					yellow Indiangrass-------------	25
					eastern gamagrass--------------	15
					prairie cordgrass--------------	10
					switchgrass--------------------	10
					Canada wildrye-----------------	5
					Florida paspalum---------------	5
					longstem spikesedge------------	5
					marsh muhly--------------------	5
					tall dropseed------------------	5
					Virginia wildrye---------------	5
					yellow bristlegrass------------	5
7090:						
Wabash-----------	Clay Lowland (pe30-37)	10,000	9,000	7,000	prairie cordgrass--------------	50
					big bluestem-------------------	20
					switchgrass--------------------	20
					eastern gamagrass--------------	10
					yellow Indiangrass-------------	10
7170:						
Reading----------	Loamy Lowland (pe35-42)	10,000	8,000	6,000	miscellaneous trees------------	10
					switchgrass--------------------	10
					yellow Indiangrass-------------	10
					miscellaneous perennial grasses	8
					miscellaneous perennial forbs--	7

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
7171:						
Reading	Loamy Lowland (pe30-37)	9,000	7,000	6,000	big bluestem	40
					yellow Indiangrass	25
					eastern gamagrass	15
					prairie cordgrass	10
					switchgrass	10
					Canada wildrye	5
					Florida paspalum	5
					longstem spikesedge	5
					marsh muhly	5
					tall dropseed	5
					Virginia wildrye	5
					yellow bristlegrass	5
7206:						
Aksarben	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem	30
					little bluestem	20
					switchgrass	10
					yellow Indiangrass	10
					leadplant	5
					miscellaneous perennial grasses	5
					sideoats grama	5
					tall dropseed	5
7207:						
Aksarben	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem	30
					little bluestem	20
					switchgrass	10
					yellow Indiangrass	10
					leadplant	5
					miscellaneous perennial grasses	5
					sideoats grama	5
					tall dropseed	5
7220:						
Burchard	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem	40
					little bluestem	25
					yellow Indiangrass	15
					eastern gamagrass	10
					switchgrass	10
					porcupinegrass	5
7224:						
Burchard	Loamy Upland (pe30-37)	4,400	3,900	3,500	big bluestem	40
					little bluestem	25
					yellow Indiangrass	15
					eastern gamagrass	10
					switchgrass	10
					porcupinegrass	5
Steinauer	Limy Upland (pe30-37)	3,200	2,700	2,500	big bluestem	35
					little bluestem	25
					sideoats grama	10
					switchgrass	10
					yellow Indiangrass	10
7225:						
Burchard	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem	40
					little bluestem	25
					yellow Indiangrass	15
					eastern gamagrass	10
					switchgrass	10
					porcupinegrass	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
7225:						
Steinauer--------	Limy Upland (pe30-37)	4,500	3,900	3,400	big bluestem------------------	35
					little bluestem----------------	25
					sideoats grama-----------------	10
					switchgrass--------------------	10
					yellow Indiangrass-------------	10
7233:						
Elmont-----------	Loamy Upland (pe30-37)	7,000	5,500	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7301:						
Martin-----------	Clay Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7424:						
Morrill, eroded--	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7433:						
Morrill----------	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7435:						
Morrill----------	Loamy Upland (pe30-37)	6,000	5,000	4,000	little bluestem----------------	20
7455:						
Olmitz-----------	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7470:						
Padonia----------	Clay Upland (pe30-37)	6,500	4,500	3,500	big bluestem------------------	40
					yellow Indiangrass-------------	20
					little bluestem----------------	15
					switchgrass--------------------	15
					eastern gamagrass--------------	10
Martin-----------	Clay Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
7500:						
Pawnee-----------	Clay Upland (pe30-37)	3,700	3,200	2,700	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7502:						
Pawnee-----------	Clay Upland (pe30-37)	3,700	3,200	2,700	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7510:						
Pawnee, eroded---	Clay Upland (pe30-37)	2,500	2,000	1,500	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7603:						
Sibleyville------	Loamy Upland (pe30-37)	6,000	5,000	3,500	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7656:						
Vinland variant--	Loamy Upland (pe30-37)	6,000	5,000	4,000	big bluestem------------------	40
					little bluestem----------------	25
					yellow Indiangrass-------------	15
					eastern gamagrass--------------	10
					switchgrass--------------------	10
					porcupinegrass-----------------	5
7681:						
Wymore-----------	Clay Upland (pe30-37)	4,100	3,600	3,200	big bluestem------------------	40
					yellow Indiangrass-------------	20
					little bluestem----------------	15
					switchgrass--------------------	15
					eastern gamagrass--------------	10
7684:						
Wymore-----------	Clay Upland (pe30-37)	4,500	3,600	2,700	little bluestem----------------	20
					switchgrass--------------------	10
					miscellaneous perennial forbs--	5
					miscellaneous perennial grasses	5
					miscellaneous shrubs-----------	5
					porcupine grass----------------	5
					sideoats grama-----------------	5
					yellow Indiangrass-------------	5
7688:						
Wymore-----------	Clay Upland (pe30-37)	3,900	3,400	3,000	big bluestem------------------	40
					yellow Indiangrass-------------	20
					little bluestem----------------	15
					switchgrass--------------------	15
					eastern gamagrass--------------	10

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year	Characteristic vegetation	Rangeland composition
		Lb/acre	Lb/acre	Lb/acre		Pct
7688:						
Baileyville	Clay Upland (pe30-37)	3,700	3,200	2,800	big bluestem	40
					yellow Indiangrass	20
					little bluestem	15
					switchgrass	15
					eastern gamagrass	10
7851:						
Judson	Loamy Lowland (pe30-37)	9,000	7,000	6,000	big bluestem	40
					yellow Indiangrass	25
					eastern gamagrass	15
					prairie cordgrass	10
					switchgrass	10
					Canada wildrye	5
					Florida paspalum	5
					longstem spikesedge	5
					marsh muhly	5
					tall dropseed	5
					Virginia wildrye	5
					yellow bristlegrass	5
9971. Arents, earthen dam						
9983. Gravel pits and quarries						
9986. Miscellaneous water						
9999. Water						

Table 8.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
4020:					
Chase	American hazelnut; blackhaw; chickasaw plum; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk	American plum; amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive, common chokecherry; common lilac; Siberian peashrub; tatarian honeysuckle	Blue spruce; Douglas fir; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Scotch pine; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white spruce	American basswood; American sycamore; Austrian pine; bitternut hickory; black cherry; black locust; black oak; black walnut; black willow; bur oak; chinkapin oak; common hackberry; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; peachleaf willow; pecan; pin oak; shagbark hickory; shellbark hickory; sugar maple; white oak	'Mighty Mo' eastern cottonwood; 'Nor'easter' eastern cottonwood; 'Ohio Red' eastern cottonwood; 'Platte' eastern cottonwood; Siberian elm; silver maple
4525:					
Benfield	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---
4590:					
Clime	Siberian peashrub; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	---	Black locust; black oak; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; Russian mulberry; Russian olive	Chinkapin oak; Siberian elm	---
Sogn.					
4710.					
Kipson					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
4725:					
Kipson.					
Sogn.					
4830:					
Wamego	American hazelnut; common lilac; golden currant; Siberian peashrub; 'Konza' fragrant sumac; tamarisk	'Cardinal' autumn-olive; 'Elsberry' autumn-olive; eastern redcedar; Siberian crabapple; tatarian honeysuckle	Austrian pine; bitternut hickory; black locust; black oak; bur oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; red mulberry; Russian mulberry; Russian olive; sugar maple; western soapberry; white oak	Norway maple; Siberian elm	---
4831:					
Wamego	American hazelnut; common lilac; golden currant; Siberian peashrub; 'Konza' fragrant sumac; tamarisk	'Cardinal' autumn-olive; 'Elsberry' autumn-olive; eastern redcedar; Siberian crabapple; tatarian honeysuckle	Austrian pine; bitternut hickory; black locust; black oak; bur oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; red mulberry; Russian mulberry; Russian olive; sugar maple; western soapberry; white oak	Norway maple; Siberian elm	---
7010:					
Calco	American plum; blackhaw; Siberian peashrub; 'Konza' fragrant sumac	Common chokecherry; common lilac; tatarian honeysuckle	Common hackberry; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; Washington hawthorn	American sycamore; black locust; bur oak; golden willow; green ash; honeylocust; northern catalpa; red mulberry; Russian mulberry	Siberian elm

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7050: Kennebec	American hazelnut; blackhaw; chickasaw plum; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; ‘Konza’ fragrant sumac; tamarisk	American plum; amur maple; amur privet; ‘Cardinal autumn-olive; ‘Elsberry’ autumn-olive; common chokecherry; common lilac; Siberian peashrub; tatarian honeysuckle	Blue spruce; Douglas fir; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Scotch pine; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white spruce	American basswood; American sycamore; Austrian pine; bitternut hickory; black cherry; black locust; black oak; black walnut; black willow; bur oak; chinkapin oak; common hackberry; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; peachleaf willow; pecan; pin oak; shagbark hickory; shellbark hickory; sugar maple; white oak	’Mighty Mo’ eastern cottonwood; ‘Nor’easter’ eastern cottonwood; ‘Ohio Red’ eastern cottonwood; ‘Platte’ eastern cottonwood; Siberian elm; silver maple
7051: Kennebec	American hazelnut; blackhaw; chickasaw plum; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; ‘Konza’ fragrant sumac; tamarisk	American plum; amur maple; amur privet; ‘Cardinal’ autumn-olive; ‘Elsberry’ autumn-olive; common chokecherry; common lilac; Siberian peashrub; tatarian honeysuckle	Blue spruce; Douglas fir; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Scotch pine; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white spruce	American basswood; American sycamore; Austrian pine; bitternut hickory; black cherry; black locust; black oak; black walnut; black willow; bur oak; chinkapin oak; common hackberry; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; peachleaf willow; pecan; pin oak; shagbark hickory; shellbark hickory; sugar maple; white oak	’Mighty Mo’ eastern cottonwood; ‘Nor’easter’ eastern cottonwood; ‘Ohio Red’ eastern cottonwood; ‘Platte’ eastern cottonwood; Siberian elm; silver maple

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7090:					
Wabash	American plum; blackhaw; forsythia; golden currant; gray dogwood; redosier dogwood; Siberian peashrub; 'Konza' fragrant sumac; tamarisk	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; common lilac; tatarian honeysuckle	Common hackberry; Douglas fir; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; Siberian crabapple; Washington hawthorn; western soapberry; white fir	American basswood; American sycamore; Austrian pine; bitternut hickory; black locust; black willow; blue spruce; bur oak; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway spruce; peachleaf willow; pecan; pin oak; red mulberry; Russian mulberry; Scotch pine; shellbark hickory; white spruce	'Mighty Mo' eastern cottonwood; 'Nor'easter' eastern cottonwood; 'Ohio Red' eastern cottonwood; 'Platte' eastern cottonwood; Siberian elm; silver maple
7170:					
Reading	American hazelnut; blackhaw; chickasaw plum; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk	American plum; amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; common lilac; Siberian peashrub; tatarian honeysuckle	Blue spruce; Douglas fir; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Scotch pine; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white spruce	American basswood; American sycamore; Austrian pine; bitternut hickory; black cherry; black locust; black oak; black walnut; black willow; bur oak; chinkapin oak; common hackberry; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; peachleaf willow; pecan; pin oak; shagbark hickory; shellbark hickory; sugar maple; white oak	'Mighty Mo' eastern cottonwood; 'Nor'easter' eastern cottonwood; 'Ohio Red' eastern cottonwood; 'Platte' eastern cottonwood; Siberian elm; silver maple

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7171: Reading	American hazelnut; blackhaw; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	American plum; amur maple; amur privet; common chokecherry; common lilac; Siberian peashrub	Blue spruce; eastern redbud; eastern redcedar; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white spruce	American basswood; American sycamore; bitternut hickory; black cherry; black locust; black oak; black walnut; black willow; bur oak; chinkapin oak; common hackberry; eastern white pine; golden willow; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; peachleaf willow; pecan; pin oak; shagbark hickory; shellbark hickory; sugar maple; white oak	'Mighty Mo' eastern cottonwood; 'Ohio Red' eastern cottonwood; 'Platte' eastern cottonwood
7206: Aksarben	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; sugar maple	---
7207: Aksarben	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; sugar maple	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7220:					
Burchard	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; sugar maple	---
7224:					
Burchard	American hazelnut; American plum; blackhaw; chickasaw plum; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; Douglas fir; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white oak; white spruce	American basswood; Austrian pine; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; scotch pine; silver maple; sugar maple	Siberian elm
Steinauer	Siberian peashrub; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	---	Black locust; black oak; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; Russian mulberry; Russian olive	Chinkapin oak; Siberian elm	---
7225:					
Burchard	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; sugar maple	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7225:					
Steinauer	American plum; common chokecherry; common lilac; golden currant; Siberian peashrub; skunkbush sumac; 'Konza' fragrant sumac	---	Black locust; black oak; blue spruce; bur oak; chinkapin oak; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; Russian mulberry; Shumard's oak	---	---
7233:					
Elmont	American hazelnut; American plum; blackhaw; chickasaw plum; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; Douglas fir; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white oak; white spruce	American basswood; Austrian pine; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; Scotch pine; silver maple; sugar maple	Siberian elm
7301:					
Martin	American hazelnut; common lilac	Common chokecherry; eastern redcedar; Siberian crabapple; Siberian peashrub	Black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Shumard's oak; white oak	---	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7424: Morrill, eroded	American hazelnut; American plum; blackhaw; chickasaw plum; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; Douglas fir; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white oak; white spruce	American basswood; Austrian pine; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; Scotch pine; silver maple; sugar maple	Siberian elm
7433: Morrill	American hazelnut; American plum; blackhaw; chickasaw plum; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; Douglas fir; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white oak; white spruce	American basswood; Austrian pine; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; Scotch pine; silver maple; sugar maple	Siberian elm
7435: Morrill	Amur honeysuckle; common lilac	---	Bur oak; common hackberry; eastern redcedar; Russian olive	Austrian pine; green ash; honeylocust; Scotch pine	---
7436: Morrill, eroded	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; sugar maple	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7455:					
Olmitz	American hazelnut; American plum; blackhaw; chickasaw plum; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	Amur maple; amur privet; 'Cardinal' autumn-olive; 'Elsberry' autumn-olive; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; Douglas fir; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Russian olive; Siberian crabapple; Washington hawthorn; western soapberry; white fir; white oak; white spruce	American basswood; Austrian pine; bitternut hickory; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway maple; Norway spruce; pecan; pin oak; Scotch pine; silver maple; sugar maple	Siberian elm
7470:					
Padonia	American hazelnut; American plum; common lilac; golden currant; Siberian peashrub; skunkbush sumac; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian crabapple	Bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; eastern redcedar; green ash; honeylocust; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; white oak	---	---
Martin	American hazelnut; common lilac	Common chokecherry; eastern redcedar; Siberian crabapple; Siberian peashrub	Black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Shumard's oak; white oak	---	---
7500:					
Pawnee	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7502:					
Pawnee	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---
7510:					
Pawnee, eroded	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---
7603:					
Sibleyville	American hazelnut; common lilac; golden currant; Siberian peashrub; 'Konza' fragrant sumac; tamarisk	'Cardinal' autumn-olive; 'Elsberry' autumn-olive; eastern redcedar; Siberian crabapple; tatarian honeysuckle	Austrian pine; bitternut hickory; black locust; black oak; bur oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; red mulberry; Russian mulberry; Russian olive; sugar maple; western soapberry; white oak	Norway maple; Siberian elm	---
7608:					
Steinauer	Siberian peashrub; 'Konza' fragrant sumac; tamarisk; tatarian honeysuckle	---	Black locust; black oak; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; Russian mulberry; Russian olive	Chinkapin oak; Siberian elm	---
7656.					
Vinland variant					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7681:					
Wymore	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---
7684:					
Wymore	Amur honeysuckle; common lilac; skunkbush sumac	---	Austrian pine; common hackberry; eastern redcedar; green ash; Manchurian crabapple; ponderosa pine; Russian olive	Honeylocust	---
7688:					
Wymore	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---
Baileyville	American hazelnut; common lilac; Siberian peashrub; tamarisk; tatarian honeysuckle	'Cardinal' autumn-olive; eastern redcedar; Siberian crabapple	Austrian pine; bitternut hickory; black locust; black oak; chinkapin oak; common hackberry; green ash; honeylocust; northern catalpa; osageorange; pin oak; red mulberry; Russian mulberry; Russian olive; western soapberry; white oak	Siberian elm	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
7851:					
Judson	American hazelnut; American plum; blackhaw; common lilac; forsythia; golden currant; gray dogwood; Nanking cherry; redosier dogwood; 'Konza' fragrant sumac	Amur maple; amur privet; common chokecherry; Siberian peashrub	Blue spruce; bur oak; chinkapin oak; common hackberry; eastern redbud; eastern redcedar; eastern white pine; oriental arborvitae; osageorange; red mulberry; Russian mulberry; Siberian crabapple; Washington hawthorn; white fir; white oak; white spruce	American basswood; black locust; black oak; green ash; honeylocust; Kentucky coffeetree; lacebark elm; northern catalpa; northern red oak; Norway spruce; pecan; pin oak; Shumard's oak; sugar maple	---
9971. Arents, earthen dam					
9983. Gravel pits and quarries					
9986. Miscellaneous water					
9999. Water					

Table 9a.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.94	Restricted permeability	0.94
		Restricted permeability	0.94			Flooding	0.60
4525:							
Benfield	90	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.39	Restricted permeability	0.39	Slope	1.00
						Gravel content	0.49
						Restricted permeability	0.39
						Depth to bedrock	0.03
4590:							
Clime	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.84	Slope	0.84	Slope	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Restricted permeability	0.39	Restricted permeability	0.39	Restricted permeability	0.39
						Depth to bedrock	0.10
Sogn	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.16	Slope	0.16	Slope	1.00
						Content of large stones	0.01
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
						Gravel content	0.54
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Sogn	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	1.00
						Content of large stones	0.01
4830:							
Wamego	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Restricted permeability	0.94
						Slope	0.88
						Depth to bedrock	0.71

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
4831:							
Wamego	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Restricted permeability	0.94	Restricted permeability	0.94	Restricted permeability	0.94
						Depth to bedrock	0.71
7010:							
Calco	90	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Depth to saturated zone	0.75	Flooding	1.00
		Depth to saturated zone	0.98	Flooding	0.40	Depth to saturated zone	0.98
7050:							
Kennebec	95	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
7051:							
Kennebec	90	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00			Flooding	0.60
7170:							
Reading	90	Very limited		Not limited		Not limited	
		Flooding	1.00				
7171:							
Reading	90	Very limited		Not limited		Not limited	
		Flooding	1.00				
7206:							
Aksarben	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	0.50
						Restricted permeability	0.15
7207:							
Aksarben	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
						Restricted permeability	0.15
7220:							
Burchard	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.15
7224:							
Burchard	63	Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
						Restricted permeability	0.15

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
7224:							
Steinauer	27	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
7225:							
Burchard	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
Steinauer	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
7233:							
Elmont	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	0.88
						Restricted permeability	0.15
7301:							
Martin	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Restricted permeability	0.94
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
						Slope	0.12
7424:							
Morrill, eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
						Gravel content	0.32
						Restricted permeability	0.15
7433:							
Morrill	90	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
						Gravel content	0.32
						Restricted permeability	0.15
7435:							
Morrill	100	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
						Restricted permeability	0.15
						Gravel content	0.06
7436:							
Morrill, eroded	87	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.15
						Gravel content	0.06

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7455:							
Olmitz--------------	91	Not limited		Not limited		Somewhat limited	
						Slope	0.12
7470:							
Padonia-------------	50	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Slope	1.00
						Restricted permeability	0.94
						Depth to bedrock	0.03
Martin--------------	40	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Slope	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Restricted permeability	0.94
						Depth to saturated zone	0.39
7500:							
Pawnee--------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Restricted permeability	0.94
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
						Slope	0.12
7502:							
Pawnee--------------	90	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Slope	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Restricted permeability	0.94
						Depth to saturated zone	0.39
7510:							
Pawnee, eroded------	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Slope	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Restricted permeability	0.94
						Depth to saturated zone	0.39
7603:							
Sibleyville---------	90	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.03
7608:							
Steinauer-----------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
7656:							
Vinland variant-----	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.90

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7681:							
Wymore	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Depth to saturated zone	0.39
7684:							
Wymore	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Slope	0.50
						Depth to saturated zone	0.39
7688:							
Wymore	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Slope	0.50
						Depth to saturated zone	0.39
Baileyville	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.94	Restricted permeability	0.94	Restricted permeability	0.94
		Depth to saturated zone	0.39	Depth to saturated zone	0.19	Slope	0.50
						Depth to saturated zone	0.39
7851:							
Judson	95	Not limited		Not limited		Somewhat limited	
						Slope	0.50
9971:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9999:							
Water	100	Not rated		Not rated		Not rated	

Table 9b.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4020:							
Chase	89	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
4525:							
Benfield	90	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.03
4590:							
Clime	50	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Slope	0.84
						Depth to bedrock	0.10
Sogn	35	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.92
						Slope	0.16
						Content of large stones	0.01
4710:							
Kipson	85	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Slope	1.00
						Carbonate content	1.00
						Droughty	0.12
4725:							
Kipson	60	Somewhat limited		Not limited		Very limited	
		Slope	0.18			Depth to bedrock	1.00
						Slope	1.00
						Carbonate content	1.00
						Droughty	0.12
Sogn	30	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Slope	0.84
						Droughty	0.80
						Content of large stones	0.01
4830:							
Wamego	85	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.71
4831:							
Wamego	85	Not limited		Not limited		Somewhat limited	
						Slope	0.96
						Depth to bedrock	0.71

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
7010:							
Calco	90	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.44	Depth to saturated zone	0.44	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	0.75
7050:							
Kennebec	95	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
7051:							
Kennebec	90	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
7170:							
Reading	90	Not limited		Not limited		Not limited	
7171:							
Reading	90	Not limited		Not limited		Not limited	
7206:							
Aksarben	87	Not limited		Not limited		Not limited	
7207:							
Aksarben	85	Not limited		Not limited		Not limited	
7220:							
Burchard	85	Not limited		Not limited		Somewhat limited	
						Slope	0.04
7224:							
Burchard	63	Not limited		Not limited		Somewhat limited	
						Slope	0.16
Steinauer	27	Not limited		Not limited		Somewhat limited	
						Slope	0.16
7225:							
Burchard	55	Not limited		Not limited		Very limited	
						Slope	1.00
Steinauer	40	Not limited		Not limited		Very limited	
						Slope	1.00
7233:							
Elmont	85	Not limited		Not limited		Not limited	
7301:							
Martin	85	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7424:							
Morrill, eroded	90	Not limited		Not limited		Not limited	

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
7433:							
Morrill	90	Not limited		Not limited		Not limited	
7435:							
Morrill	100	Not limited		Not limited		Not limited	
7436:							
Morrill, eroded	87	Not limited		Not limited		Somewhat limited	
						Slope	0.04
7455:							
Olmitz	91	Not limited		Not limited		Not limited	
7470:							
Padonia	50	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.03
Martin	40	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7500:							
Pawnee	90	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7502:							
Pawnee	90	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7510:							
Pawnee, eroded	85	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7603:							
Sibleyville	90	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.03
7608:							
Steinauer	90	Somewhat limited		Not limited		Very limited	
		Slope	0.32			Slope	1.00
7656:							
Vinland variant	90	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.90
7681:							
Wymore	90	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7684:							
Wymore	95	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
7688:							
Wymore	45	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
Baileyville	40	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
7851:							
Judson	95	Not limited		Not limited		Not limited	
9971:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9999:							
Water	100	Not rated		Not rated		Not rated	

Table 10.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
4020:												
Chase	Good	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair	---
4525:												
Benfield	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
4590:												
Clime	Fair	Fair	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Sogn	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	---	Very poor	Poor
4710:												
Kipson	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
4725:												
Kipson	Poor	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor	Fair
Sogn	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Poor
4830:												
Wamego	Fair	Good	Fair	Fair	Fair	Good	Poor	Very poor	Fair	Fair	Very poor	Fair
4831:												
Wamego	Poor	Fair	Fair	Fair	Fair	Good	Very poor	Very poor	Fair	Fair	Very poor	Fair
7010:												
Calco	Good	Fair	Good	Poor	Very poor	---	Good	Good	Fair	Poor	Fair	---
7050:												
Kennebec	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
7051:												
Kennebec	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
7090:												
Wabash	Poor	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good	---
7170:												
Reading	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	---
7171:												
Reading	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good
7206:												
Aksarben	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
7207:												
Aksarben	Fair	Good	Good	Good	Good	Good	Very poor	Poor	Good	Good	Very poor	Good

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
7220:												
Burchard	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
7224:												
Burchard	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Steinauer	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
7225:												
Burchard	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
Steinauer	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
7233:												
Elmont	Fair	Good	Good	Fair	Fair	Good	Poor	Very poor	Good	Fair	Very poor	Good
7301:												
Martin	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good
7424:												
Morrill, eroded	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
7433:												
Morrill	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
7435:												
Morrill	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
7436:												
Morrill, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
7455:												
Olmitz	Good	Good	Fair	Good	Good	---	Poor	Poor	Good	Good	Poor	---
7470:												
Padonia	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Martin	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
7500:												
Pawnee	Fair	Good	Good	---	Fair	Fair	Very poor	Poor	Good	---	Poor	Fair
7502:												
Pawnee	Fair	Good	Good	---	Fair	Fair	Very poor	Poor	Good	---	Poor	Fair
7510:												
Pawnee, eroded	Fair	Good	Good	---	Fair	Fair	Very poor	Poor	Good	---	Poor	Fair

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
7603: Sibleyville	Fair	Good	Good	Fair	Fair	Good	Poor	Very poor	Good	Fair	Very poor	Good
7608: Steinauer	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
7656: Vinland variant	Poor	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
7681: Wymore	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
7684: Wymore	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
7688: Wymore	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
Baileyville	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
7851: Judson	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
9971. Arents, earthen dam												
9983. Gravel pits and quarries												
9986. Miscellaneous water												
9999. Water												

Table 11a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.95		
4525:							
Benfield	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.03	Slope	0.88
4590:							
Clime	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.84	Slope	0.84	Slope	1.00
				Depth to soft bedrock	0.10		
Sogn	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.16	Slope	0.16	Shrink-swell	0.50
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Sogn	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
Wamego	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.71	Slope	0.12

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
4831:							
Wamego	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.96	Slope	0.96	Slope	1.00
				Depth to soft bedrock	0.71		
7010:							
Calco	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
7050:							
Kennebec	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.11	Depth to saturated zone	0.82	Shrink-swell	0.11
				Shrink-swell	0.11		
7051:							
Kennebec	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.06	Depth to saturated zone	0.61	Shrink-swell	0.06
				Shrink-swell	0.06		
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
7170:							
Reading	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.92	Shrink-swell	0.92	Shrink-swell	0.92
7171:							
Reading	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.73	Shrink-swell	0.73	Shrink-swell	0.73
7206:							
Aksarben	87	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
7207:							
Aksarben	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	1.00
7220:							
Burchard	85	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.96	Shrink-swell	0.11	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.96

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
7224:							
Burchard-----------	63	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.96	Shrink-swell	0.11	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.96
Steinauer----------	27	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.16	Slope	0.16	Shrink-swell	0.50
7225:							
Burchard-----------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.96	Shrink-swell	0.11	Shrink-swell	0.96
Steinauer----------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.32	Shrink-swell	0.32	Shrink-swell	0.32
7233:							
Elmont-------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.92	Shrink-swell	0.92	Shrink-swell	0.92
						Slope	0.12
7301:							
Martin-------------	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
7424:							
Morrill, eroded-----	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.82	Shrink-swell	0.50	Shrink-swell	0.82
						Slope	0.50
7433:							
Morrill------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.82	Shrink-swell	0.82	Shrink-swell	0.82
						Slope	0.50
7435:							
Morrill------------	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
						Shrink-swell	0.50
7436:							
Morrill, eroded-----	87	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.62	Slope	0.04	Slope	1.00
		Slope	0.04			Shrink-swell	0.62
7455:							
Olmitz-------------	91	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.11	Shrink-swell	0.38	Shrink-swell	0.11
7470:							
Padonia------------	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.03	Slope	0.88

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
7470:							
Martin	40	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Slope	1.00
						Depth to saturated zone	0.39
7500:							
Pawnee	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
7502:							
Pawnee	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Slope	0.50
						Depth to saturated zone	0.39
7510:							
Pawnee, eroded	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Slope	0.50
						Depth to saturated zone	0.39
7603:							
Sibleyville	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.01	Depth to soft bedrock	0.03	Slope	0.50
						Shrink-swell	0.01
7608:							
Steinauer	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
7656:							
Vinland variant	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.90		
7681:							
Wymore	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
7684:							
Wymore	95	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
7688:							
Wymore	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
7688:							
Baileyville---------	40	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
7851:							
Judson--------------	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.22	Shrink-swell	0.50	Shrink-swell	0.22
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 11b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	0.95	Flooding	0.60
		Frost action	1.00	Flooding	0.60		
		Flooding	1.00	Too clayey	0.12		
		Low strength	1.00	Cutbanks cave	0.10		
4525:							
Benfield	90	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Cutbanks cave	0.10	Depth to bedrock	0.03
		Low strength	1.00	Too clayey	0.04		
		Frost action	0.50	Depth to soft bedrock	0.03		
4590:							
Clime	50	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Slope	0.84	Too clayey	1.00
		Low strength	1.00	Too clayey	0.32	Slope	0.84
		Slope	0.84	Cutbanks cave	0.10	Depth to bedrock	0.10
		Frost action	0.50	Depth to soft bedrock	0.10		
Sogn	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
						Droughty	0.92
		Low strength	1.00	Slope	0.16	Slope	0.16
		Shrink-swell	0.50	Cutbanks cave	0.10	Content of large stones	0.01
		Frost action	0.50				
		Slope	0.16				
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
		Slope	1.00	Slope	1.00	Carbonate content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Droughty	0.12
		Shrink-swell	0.50				
		Frost action	0.50				
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
		Slope	1.00	Slope	1.00	Carbonate content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Droughty	0.12
		Shrink-swell	0.50				
		Frost action	0.50				
Sogn	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
						Slope	0.84
		Low strength	1.00	Slope	0.84	Droughty	0.80
		Slope	0.84	Cutbanks cave	0.10	Content of large stones	0.01
		Shrink-swell	0.73				
		Frost action	0.50				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
4830:							
Wamego	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.71	Depth to bedrock	0.71
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
4831:							
Wamego	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.96	Slope	0.96
		Shrink-swell	1.00	Depth to soft bedrock	0.71	Depth to bedrock	0.71
		Slope	0.96	Cutbanks cave	0.10		
		Frost action	0.50				
7010:							
Calco	90	Very limited		Very limited		Very limited	
		Frost action	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Flooding	0.80	Depth to saturated zone	0.75
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.75				
		Shrink-swell	0.50				
7050:							
Kennebec	95	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.82	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.11				
7051:							
Kennebec	90	Very limited		Somewhat limited		Very limited	
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.06				
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Too clayey	0.50		
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
7170:							
Reading	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00	Too clayey	0.02		
		Shrink-swell	0.92				
		Flooding	0.40				
7171:							
Reading	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.73				
		Flooding	0.40				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7206:							
Aksarben-----------	87	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Frost action	1.00				
		Low strength	1.00				
7207:							
Aksarben-----------	85	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Frost action	1.00				
		Low strength	1.00				
7220:							
Burchard-----------	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.04
		Shrink-swell	0.96	Slope	0.04		
		Frost action	0.50				
		Slope	0.04				
7224:							
Burchard-----------	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.04
		Shrink-swell	0.96	Slope	0.04		
		Frost action	0.50				
		Slope	0.04				
Steinauer----------	27	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.16	Slope	0.16
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
		Slope	0.16				
7225:							
Burchard-----------	55	Very limited		Very limited		Very limited	
		Low strength	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.96				
		Frost action	0.50				
Steinauer----------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
		Shrink-swell	0.32				
7233:							
Elmont-------------	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.92				
7301:							
Martin-------------	85	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.28		
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7424:							
Morrill, eroded-----	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.82				
		Frost action	0.50				
7433:							
Morrill------------	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.82				
		Frost action	0.50				
7435:							
Morrill------------	100	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
7436:							
Morrill, eroded-----	87	Somewhat limited		Very limited		Somewhat limited	
		Low strength	0.78	Cutbanks cave	1.00	Slope	0.04
		Shrink-swell	0.62	Slope	0.04		
		Frost action	0.50				
		Slope	0.04				
7455:							
Olmitz-------------	91	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
		Shrink-swell	0.11				
7470:							
Padonia------------	50	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Cutbanks cave	0.10	Depth to bedrock	0.03
		Shrink-swell	1.00	Too clayey	0.03		
		Frost action	0.50	Depth to soft bedrock	0.03		
Martin-------------	40	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00				
		Low strength	1.00	Too clayey	0.28		
		Depth to saturated zone	0.19	Cutbanks cave	0.10		
7500:							
Pawnee-------------	90	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00				
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.19	Cutbanks cave	0.10		
7502:							
Pawnee-------------	90	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00				
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	0.19	Cutbanks cave	0.10		

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
7510:							
Pawnee, eroded	85	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.12		
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
7603:							
Sibleyville	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	0.10	Depth to bedrock	0.03
		Shrink-swell	0.01	Depth to soft bedrock	0.03		
7608:							
Steinauer	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
7656:							
Vinland variant	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Depth to soft bedrock	0.90	Depth to bedrock	0.90
				Cutbanks cave	0.10		
7681:							
Wymore	90	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.24		
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
7684:							
Wymore	95	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.24		
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
7688:							
Wymore	45	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.24		
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
Baileyville	40	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.12		
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
7851:							
Judson	95	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.22				
9971:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9999:							
Water	100	Not rated		Not rated		Not rated	

Table 12a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4020:					
Chase	89	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00		
		Depth to saturated zone	1.00		
4525:					
Benfield	90	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
4590:					
Clime	50	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.84		
Sogn	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.16	Slope	1.00
4710:					
Kipson	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
4725:					
Kipson	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
Sogn	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.84	Slope	1.00
4830:					
Wamego	85	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.68

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
4831:					
Wamego	85	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.96		
7010:					
Calco	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.50	Seepage	0.50
7050:					
Kennebec	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.50	Seepage	0.50
7051:					
Kennebec	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Restricted permeability	0.50	Seepage	0.50
7090:					
Wabash	91	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
7170:					
Reading	90	Somewhat limited		Somewhat limited	
		Restricted permeability	0.68	Seepage	0.50
		Flooding	0.40	Flooding	0.40
7171:					
Reading	90	Somewhat limited		Somewhat limited	
		Restricted permeability	0.68	Seepage	0.50
		Flooding	0.40	Flooding	0.40
7206:					
Aksarben	87	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.32
7207:					
Aksarben	85	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.50

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
7220:					
Burchard------------	85	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.04		
7224:					
Burchard------------	63	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.04		
Steinauer-----------	27	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.16		
7225:					
Burchard------------	55	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
Steinauer-----------	40	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
7233:					
Elmont--------------	85	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to soft bedrock	0.84
		Depth to bedrock	0.94	Slope	0.68
7301:					
Martin--------------	85	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.75
		Depth to saturated zone	1.00	Slope	0.08
7424:					
Morrill, eroded-----	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.92
7433:					
Morrill-------------	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.92
7435:					
Morrill-------------	100	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.25

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
7436:					
Morrill, eroded-----	87	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Seepage	1.00	Seepage	1.00
		Slope	0.04		
7455:					
Olmitz--------------	91	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.08
7470:					
Padonia-------------	50	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
Martin--------------	40	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.75
7500:					
Pawnee--------------	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.75
		Depth to saturated zone	1.00	Slope	0.08
7502:					
Pawnee--------------	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.92
		Depth to saturated zone	1.00	Depth to saturated zone	0.75
7510:					
Pawnee, eroded------	85	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.92
		Depth to saturated zone	1.00	Depth to saturated zone	0.75
7603:					
Sibleyville---------	90	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.50	Slope	0.92
				Seepage	0.50
7608:					
Steinauer-----------	90	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
7656:					
Vinland variant-----	90	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
		Restricted permeability	0.50	Seepage	0.50
7681:					
Wymore--------------	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.75
		Depth to saturated zone	1.00		
7684:					
Wymore--------------	95	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	0.32
7688:					
Wymore--------------	45	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.75
		Depth to saturated zone	1.00	Slope	0.32
Baileyville---------	40	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.75
		Depth to saturated zone	1.00	Slope	0.32
7851:					
Judson--------------	95	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.32
9971:					
Arents, earthen dam-	100	Not rated		Not rated	
9983:					
Gravel pits and quarries-----------	100	Not rated		Not rated	
9986:					
Miscellaneous water-	100	Not rated		Not rated	
9999:					
Water---------------	100	Not rated		Not rated	

Table 12b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Depth to saturated zone	0.44			Depth to saturated zone	0.09
4525:							
Benfield	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
4590:							
Clime	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00	Slope	0.84	Too clayey	1.00
		Slope	0.84			Hard to compact	1.00
						Slope	0.84
Sogn	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50	Slope	0.16	Too clayey	0.50
		Slope	0.16			Slope	0.16
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Carbonate content	1.00
						Too clayey	0.50
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Carbonate content	1.00
						Too clayey	0.50
Sogn	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.84	Slope	0.84	Slope	0.84
		Too clayey	0.50			Too clayey	0.50
4830:							
Wamego	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
4831:							
Wamego	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.96	Slope	0.96	Hard to compact	1.00
		Too clayey	0.50			Slope	0.96
						Too clayey	0.50

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
7010:							
Calco	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
		Too clayey	0.50				
7050:							
Kennebec	95	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
7051:							
Kennebec	90	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
7170:							
Reading	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
7171:							
Reading	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
7206:							
Aksarben	87	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
7207:							
Aksarben	85	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
7220:							
Burchard	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Slope	0.04
7224:							
Burchard	63	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Slope	0.04
Steinauer	27	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Slope	0.16	Too clayey	0.50
		Slope	0.16			Slope	0.16

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7225:							
Burchard	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Steinauer	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
7233:							
Elmont	85	Very limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	1.00	Depth to bedrock	0.84	Depth to bedrock	0.84
		Too clayey	0.50			Too clayey	0.50
7301:							
Martin	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7424:							
Morrill, eroded	90	Not limited		Not limited		Not limited	
7433:							
Morrill	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
7435:							
Morrill	100	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
7436:							
Morrill, eroded	87	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Slope	0.04	Seepage	0.50
		Slope	0.04			Slope	0.04
7455:							
Olmitz	91	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
7470:							
Padonia	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
Martin	40	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7500:							
Pawnee	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
7502:							
Pawnee	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7510:							
Pawnee, eroded	85	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7603:							
Sibleyville	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
7608:							
Steinauer	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
7656:							
Vinland variant	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
7681:							
Wymore	90	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7684:							
Wymore	95	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7688:							
Wymore	45	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
Baileyville	40	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Depth to saturated zone	1.00			Hard to compact	1.00
						Depth to saturated zone	0.86
7851:							
Judson	95	Somewhat limited		Not limited		Not limited	
		Too clayey	0.50				

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 13a.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Flooding	1.00	Restricted permeability	1.00
		Flooding	0.60	Restricted permeability	1.00	Flooding	0.60
		Depth to saturated zone	0.43	Depth to saturated zone	0.43	Depth to saturated zone	0.43
4525:							
Benfield	90	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Low adsorption	1.00	Restricted permeability	1.00
		Depth to bedrock	0.03	Restricted permeability	1.00	Too steep for surface application	0.92
				Depth to bedrock	0.03	Depth to bedrock	0.03
						Too steep for sprinkler application	0.02
4590:							
Clime	50	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Low adsorption	1.00	Restricted permeability	1.00
		Slope	0.84	Restricted permeability	1.00	Too steep for surface application	1.00
		Droughty	0.34	Slope	0.84	Too steep for sprinkler application	0.90
		Depth to bedrock	0.10	Droughty	0.34	Droughty	0.34
				Depth to bedrock	0.10	Depth to bedrock	0.10
Sogn	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00	Too steep for surface application	1.00
		Slope	0.16	Slope	0.16	Too steep for sprinkler application	0.40
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Droughty	0.93	Slope	1.00	Too steep for sprinkler application	1.00
		Runoff	0.40	Droughty	0.93	Droughty	0.93

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Droughty	0.94	Slope	1.00	Too steep for sprinkler application	1.00
		Runoff	0.40		0.94	Droughty	0.94
Sogn	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
4830:							
Wamego	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Low adsorption	1.00	Restricted permeability	1.00
		Depth to bedrock	0.71	Restricted permeability	1.00	Depth to bedrock	0.71
		Droughty	0.17	Depth to bedrock	0.71	Too steep for surface application	0.32
		Too acid	0.03	Droughty	0.17	Droughty	0.17
				Too acid	0.14	Too acid	0.14
4831:							
Wamego	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Low adsorption	1.00	Restricted permeability	1.00
		Slope	0.96	Restricted permeability	1.00	Too steep for surface application	1.00
		Depth to bedrock	0.71	Slope	0.96	Too steep for sprinkler application	0.98
		Droughty	0.17	Depth to bedrock	0.71	Depth to bedrock	0.71
		Too acid	0.03	Droughty	0.17	Droughty	0.17
7010:							
Calco	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Runoff	0.40				
7050:							
Kennebec	95	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Depth to saturated zone	0.09	Depth to saturated zone	0.09	Depth to saturated zone	0.09
7051:							
Kennebec	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
7090:							
Wabash--------------	91	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
7170:							
Reading-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Flooding	0.40	Too acid	0.14
				Too acid	0.14		
7171:							
Reading-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.03	Flooding	0.40	Too acid	0.14
				Too acid	0.14		
7206:							
Aksarben------------	87	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.30	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Restricted permeability	0.22	Restricted permeability	0.22
						Too steep for surface application	0.08
7207:							
Aksarben------------	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Too acid	0.42	Too steep for surface application	1.00
		Too acid	0.11	Restricted permeability	0.22	Too acid	0.42
						Restricted permeability	0.22
						Too steep for sprinkler application	0.10
7220:							
Burchard------------	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	1.00
		Too acid	0.05	Too acid	0.21	Too steep for sprinkler application	0.22
		Slope	0.04	Slope	0.04	Restricted permeability	0.22
						Too acid	0.21

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
7224:							
Burchard------------	63	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	1.00
		Too acid	0.05	Too acid	0.21	Too steep for sprinkler application	0.22
		Slope	0.04	Slope	0.04	Restricted permeability	0.22
						Too acid	0.21
Steinauer-----------	27	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	1.00
		Slope	0.16	Slope	0.16	Too steep for sprinkler application	0.40
						Restricted permeability	0.22
7225:							
Burchard------------	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for sprinkler application	1.00
		Too acid	0.05	Too acid	0.21	Restricted permeability	0.22
						Too acid	0.21
Steinauer-----------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted	0.30	Restricted permeability	0.22	Too steep for sprinkler application	1.00
						Restricted permeability	0.22
7233:							
Elmont--------------	85	Somewhat limited		Very limited		Somewhat limited	
		Restricted permeability	0.30	Low adsorption	1.00	Too steep for surface application	0.32
		Too acid	0.02	Restricted permeability	0.22	Restricted permeability	0.22
				Too acid	0.07	Too acid	0.07
7301:							
Martin--------------	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too acid	0.03	Too acid	0.14	Too acid	0.14

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7424:							
Morrill, eroded-----	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	0.68
		Too acid	0.02	Too acid	0.07	Restricted permeability	0.22
						Too acid	0.07
7433:							
Morrill-------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	0.68
		Too acid	0.02	Too acid	0.07	Restricted permeability	0.22
						Too acid	0.07
7435:							
Morrill-------------	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.30	Too acid	0.31	Too steep for surface application	0.92
		Too acid	0.08	Restricted permeability	0.22	Too acid	0.31
						Restricted permeability	0.22
						Too steep for sprinkler application	0.02
7436:							
Morrill, eroded-----	87	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	1.00
		Slope	0.04	Too acid	0.07	Too steep for sprinkler application	0.22
		Too acid	0.02	Slope	0.04	Restricted permeability	0.22
						Too acid	0.07
7455:							
Olmitz--------------	91	Not limited		Not limited		Not limited	
7470:							
Padonia-------------	50	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Low adsorption	1.00	Restricted permeability	1.00
		Depth to bedrock	0.03	Restricted permeability	1.00	Too steep for surface application	0.92
				Depth to bedrock	0.03	Depth to bedrock	0.03
						Too steep for sprinkler application	0.02

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
7470:							
Martin	40	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too steep for surface application	1.00
		Too acid	0.03	Too acid	0.14	Depth to saturated zone	1.00
						Too acid	0.14
						Too steep for sprinkler application	0.10
7500:							
Pawnee	90	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40				
7502:							
Pawnee	90	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40			Too steep for surface application	0.68
7510:							
Pawnee, eroded	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40			Too steep for surface application	0.68
7603:							
Sibleyville	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.03	Low adsorption	1.00	Too steep for surface application	0.68
				Depth to bedrock	0.03	Depth to bedrock	0.03
7608:							
Steinauer	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for sprinkler application	1.00
						Restricted permeability	0.22

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
7656:							
Vinland variant-----	90	Very limited		Very limited		Very limited	
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Depth to bedrock	0.90	Slope	1.00		
		Droughty	0.11	Depth to bedrock	0.90		
				Droughty	0.11	Too steep for sprinkler application	1.00
						Depth to bedrock	0.90
						Droughty	0.11
7681:							
Wymore--------------	90	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Too acid	0.21	Too acid	0.21
		Too acid	0.05				
7684:							
Wymore--------------	95	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Too acid	0.21	Too acid	0.21
		Too acid	0.05			Too steep for surface application	0.08
7688:							
Wymore--------------	45	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40	Too acid	0.21	Too acid	0.21
		Too acid	0.05			Too steep for surface application	0.08
Baileyville---------	40	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40			Too steep for surface application	0.08
7851:							
Judson--------------	95	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.08

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 13b.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4020:							
Chase	89	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	0.94
		Seepage	0.77	Flooding	0.60	Flooding	0.60
		Depth to saturated zone	0.43	Depth to saturated zone	0.44	Depth to saturated zone	0.43
4525:							
Benfield	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Seepage	0.77	Depth to bedrock	1.00	Restricted permeability	0.94
		Too steep for surface application	0.06	Slope	0.88	Too steep for surface application	0.92
						Too steep for sprinkler application	0.06
4590:							
Clime	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Too steep for surface application	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
				Slope	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.94
Sogn	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.78	Slope	1.00	Too steep for sprinkler application	0.78
4710:							
Kipson	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
4725:							
Kipson	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00
Sogn	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00
4830:							
Wamego	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.94
		Too acid	0.14	Slope	0.12	Too steep for surface application	0.32
						Too acid	0.14
4831:							
Wamego	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00
		Too acid	0.14			Restricted permeability	0.94
						Too acid	0.14
7010:							
Calco	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Seepage	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00		
7050:							
Kennebec	95	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Seepage	1.00	Restricted permeability	1.00	Depth to saturated zone	0.09
		Depth to saturated zone	0.09	Flooding	0.60		

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
7051:							
Kennebec	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Seepage	1.00	Depth to saturated zone	1.00		
				Restricted permeability	1.00		
7090:							
Wabash	91	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
				Flooding	0.60	Flooding	0.60
7170:							
Reading	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.14
		Flooding	0.40				
		Too acid	0.14				
7171:							
Reading	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.14
		Flooding	0.40				
		Too acid	0.14				
7206:							
Aksarben	87	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Restricted permeability	0.15
						Too steep for surface application	0.08
7207:							
Aksarben	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too acid	0.42	Slope	1.00	Too acid	0.42
		Too steep for surface application	0.22			Too steep for sprinkler application	0.22
						Restricted permeability	0.15
7220:							
Burchard	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.77	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.50	Slope	1.00	Too steep for sprinkler application	0.50
		Too acid	0.21			Too acid	0.21
						Restricted permeability	0.15

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
7224:							
Burchard	63	Somewhat limited		Very limited		Very limited	
		Seepage	0.77	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.50	Slope	1.00	Too steep for sprinkler application	0.50
		Too acid	0.21			Too acid	0.21
						Restricted permeability	0.15
Steinauer	27	Somewhat limited		Very limited		Very limited	
		Too steep for surface application	0.78	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.77	Restricted	1.00	Too steep for sprinkler application	0.78
						Restricted permeability	0.15
7225:							
Burchard	55	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.77	Restricted permeability	1.00	Too steep for sprinkler application	1.00
		Too acid	0.21			Too acid	0.21
						Restricted permeability	0.15
Steinauer	40	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.77	Restricted permeability	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.15
7233:							
Elmont	85	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	0.84
		Depth to bedrock	0.84	Depth to bedrock	1.00	Too steep for surface application	0.32
		Too acid	0.07	Slope	0.12	Restricted permeability	0.15
						Too acid	0.07
7301:							
Martin	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.77	Depth to saturated zone	1.00	Restricted permeability	0.94
		Too acid	0.14			Too acid	0.14

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7424:							
Morrill, eroded-----	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.68
		Too acid	0.07	Slope	0.50	Restricted permeability	0.15
						Too acid	0.07
7433:							
Morrill-------------	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.68
		Too acid	0.07	Slope	0.50	Restricted permeability	0.15
						Too acid	0.07
7435:							
Morrill-------------	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.92
		Too acid	0.31	Slope	0.88	Too acid	0.31
		Too steep for surface application	0.06			Restricted permeability	0.15
						Too steep for sprinkler application	0.06
7436:							
Morrill, eroded-----	87	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for suface application	0.50	Slope	1.00	Too steep for sprinkler application	0.50
		Too acid	0.07			Restricted permeability	0.15
						Too acid	0.07
7455:							
Olmitz--------------	91	Very limited		Very limited		Not limited	
		Seepage	1.00	Restricted permeability	1.00		
7470:							
Padonia-------------	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.94
		Too steep for surface application	0.06	Slope	0.88	Too steep for surface application	0.92
						Too steep for sprinkler application	0.06

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
7470:							
Martin	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Seepage	0.77	Slope	1.00	Depth to saturated zone	1.00
		Too steep for surface application	0.22	Depth to saturated zone	1.00	Restricted permeability	0.94
		Too acid	0.14			Too steep for sprinkler application	0.22
						Too acid	0.14
7500:							
Pawnee	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.77	Depth to saturated zone	1.00	Restricted permeability	0.94
7502:							
Pawnee	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.77	Depth to saturated zone	1.00	Restricted permeability	0.94
				Slope	0.50	Too steep for surface application	0.68
7510:							
Pawnee, eroded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.77	Depth to saturated zone	1.00	Restricted permeability	0.94
				Slope	0.50	Too steep for surface application	0.68
7603:							
Sibleyville	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	0.68
				Slope	0.50		
7608:							
Steinauer	90	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.77	Restricted permeability	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.15

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7656:							
Vinland variant-----	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Slope	1.00	Too steep for sprinkler application	1.00
7681:							
Wymore--------------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.77	Depth to saturated zone	1.00	Restricted permeability	0.96
		Too acid	0.21			Too acid	0.21
7684:							
Wymore--------------	95	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Too acid	0.21	Depth to saturated zone	1.00	Restricted permeability	0.96
		Seepage	0.04			Too acid	0.21
						Too steep for surface application	0.08
7688:							
Wymore--------------	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Too acid	0.21	Depth to saturated zone	1.00	Restricted permeability	0.96
		Seepage	0.04			Too acid	0.21
						Too steep for surface application	0.08
Baileyville---------	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	0.01	Depth to saturated zone	1.00	Restricted permeability	0.98
						Too steep for surface application	0.08
7851:							
Judson--------------	95	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.08

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 14a.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
4020:					
Chase	89	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4525:					
Benfield	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4590:					
Clime	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Sogn	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4710:					
Kipson	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4725:					
Kipson	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Sogn	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4830:					
Wamego	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4831:					
Wamego	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7010:					
Calco	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7050:					
Kennebec	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
7051:					
Kennebec	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7090:					
Wabash	91	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7170:					
Reading	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7171:					
Reading	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7206:					
Aksarben	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7207:					
Aksarben	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7220:					
Burchard	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7224:					
Burchard	63	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Steinauer	27	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7225:					
Burchard	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Steinauer	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7233:					
Elmont	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7301:					
Martin	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
7424:					
Morrill, eroded-----	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7433:					
Morrill-------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7435:					
Morrill-------------	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7436:					
Morrill, eroded-----	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7455:					
Olmitz--------------	91	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7470:					
Padonia-------------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Martin--------------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7500:					
Pawnee--------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7502:					
Pawnee--------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7510:					
Pawnee, eroded------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7603:					
Sibleyville---------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7608:					
Steinauer-----------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Potential source of gravel: Value	Potential source of sand: Rating class	Potential source of sand: Value
7656:					
Vinland variant-----	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7681:					
Wymore--------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7684:					
Wymore--------------	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7688:					
Wymore--------------	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Baileyville---------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7851:					
Judson--------------	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9971:					
Arents, earthen dam-	100	Not rated		Not rated	
9983:					
Gravel pits and quarries-----------	100	Not rated		Not rated	
9986:					
Miscellaneous water-	100	Not rated		Not rated	
9999:					
Water---------------	100	Not rated		Not rated	

Table 14b.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
4020:							
Chase	89	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.10		
4525:							
Benfield	90	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Low content of organic matter	0.88	Low strength	0.00	Rock fragments	0.59
		Depth to bedrock	0.97	Shrink-swell	0.12	Depth to bedrock	0.97
		Water erosion	0.99				
4590:							
Clime	50	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Droughty	0.66	Low strength	0.00	Slope	0.16
		Depth to bedrock	0.90	Shrink-swell	0.06	Depth to bedrock	0.90
Sogn	35	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00	Slope	0.84
		Too clayey	0.98	Shrink-swell	0.87	Too clayey	0.93
4710:							
Kipson	85	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Carbonate content	0.00	Low strength	0.00	Carbonate content	0.00
		Droughty	0.07	Shrink-swell	0.87	Slope	0.00
		Low content of organic matter	0.88			Rock fragments	0.24
		Too clayey	0.92			Too clayey	0.66
4725:							
Kipson	60	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Carbonate content	0.00	Low strength	0.00	Carbonate content	0.00
		Droughty	0.06	Slope	0.82	Slope	0.00
		Low content of organic matter	0.88	Shrink-swell	0.99		
Sogn	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00	Slope	0.16
		Too clayey	0.98	Shrink-swell	0.80	Too clayey	0.93
4830:							
Wamego	85	Fair		Poor		Fair	
		Too clayey	0.02	Depth to bedrock	0.00	Too clayey	0.02
		Depth to bedrock	0.29	Low strength	0.00	Depth to bedrock	0.29
		Droughty	0.83	Shrink-swell	0.32		
		Water erosion	0.90				
		Too acid	0.95				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
4831:							
Wamego	85	Fair		Poor		Fair	
		Too clayey	0.02	Depth to bedrock	0.00	Too clayey	0.02
		Depth to bedrock	0.29	Low strength	0.00	Slope	0.04
		Droughty	0.83	Shrink-swell	0.32	Depth to bedrock	0.29
		Water erosion	0.90				
		Too acid	0.95				
7010:							
Calco	90	Fair		Poor		Fair	
		Low content of organic matter	0.88	Low strength	0.00	Depth to saturated zone	0.14
		Carbonate content	0.97	Depth to saturated zone	0.14	Carbonate content	0.97
				Shrink-swell	0.87		
7050:							
Kennebec	95	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
				Shrink-swell	0.96		
7051:							
Kennebec	90	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
				Shrink-swell	0.96		
7090:							
Wabash	91	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
				Low strength	0.00	Depth to saturated zone	0.00
				Shrink-swell	0.00		
7170:							
Reading	90	Fair		Poor		Fair	
		Too clayey	0.82	Low strength	0.00	Too clayey	0.72
		Water erosion	0.90	Shrink-swell	0.54		
		Too acid	0.95				
7171:							
Reading	90	Fair		Poor		Fair	
		Water erosion	0.90	Low strength	0.00	Too clayey	0.89
		Too acid	0.95	Shrink-swell	0.84		
		Too clayey	0.98				
7206:							
Aksarben	87	Fair		Poor		Fair	
		Too clayey	0.08	Low strength	0.00	Too clayey	0.07
		Too acid	0.84	Shrink-swell	0.27		
		Water erosion	0.90				
7207:							
Aksarben	85	Fair		Poor		Fair	
		Too clayey	0.08	Low strength	0.00	Too clayey	0.07
		Too acid	0.84	Shrink-swell	0.26		
		Water erosion	0.90				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
7220:							
Burchard	85	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.49
		Too clayey	0.68	Shrink-swell	0.87	Slope	0.96
		Too acid	0.92				
		Water erosion	0.99				
7224:							
Burchard	63	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Too clayey	0.49
		Too clayey	0.68	Shrink-swell	0.87	Slope	0.96
		Too acid	0.92				
		Water erosion	0.99				
Steinauer	27	Fair		Poor		Fair	
		Low content of organic matter	0.08	Low strength	0.00	Slope	0.84
				Shrink-swell	0.87		
7225:							
Burchard	55	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Too clayey	0.68	Shrink-swell	0.87	Too clayey	0.49
		Too acid	0.92				
		Water erosion	0.99				
Steinauer	40	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.99	Shrink-swell	0.91		
7233:							
Elmont	85	Fair		Poor		Fair	
		Too clayey	0.82	Low strength	0.00	Too clayey	0.72
		Water erosion	0.90	Depth to bedrock	0.16		
		Too acid	0.97	Shrink-swell	0.77		
7301:							
Martin	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.95	Shrink-swell	0.00	Depth to saturated zone	0.53
		Water erosion	0.99	Depth to saturated zone	0.53		
7424:							
Morrill, eroded	90	Fair		Fair		Fair	
		Too clayey	0.92	Low strength	0.22	Rock fragments	0.32
		Too acid	0.97	Shrink-swell	0.84	Too clayey	0.80
7433:							
Morrill	90	Fair		Poor		Fair	
		Too clayey	0.92	Low strength	0.00	Rock fragments	0.32
		Too acid	0.97	Shrink-swell	0.83	Too clayey	0.80
7435:							
Morrill	100	Fair		Fair		Fair	
		Low content of organic matter	0.68	Shrink-swell	0.99	Rock fragments	0.88
		Too acid	0.88				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
7436:							
Morrill, eroded	87	Fair		Fair		Fair	
		Low content of organic matter	0.12	No shrink-swell	0.99	Rock fragments	0.88
						Slope	0.96
		Too acid	0.97				
7455:							
Olmitz	91	Good		Poor		Good	
				Low strength	0.00		
				Shrink-swell	0.93		
7470:							
Padonia	50	Poor		Poor		Poor	
		Too clayey	0.00	Depth to bedrock	0.00	Too clayey	0.00
		Water erosion	0.90	Low strength	0.00	Depth to bedrock	0.97
		Depth to bedrock	0.97	Shrink-swell	0.36		
Martin	40	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.95	Shrink-swell	0.00	Depth to saturated zone	0.53
		Water erosion	0.99	Depth to saturated zone	0.53		
7500:							
Pawnee	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.21	Depth to saturated zone	0.53
				Depth to saturated zone	0.53		
7502:							
Pawnee	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.19	Depth to saturated zone	0.53
				Depth to saturated zone	0.53		
7510:							
Pawnee, eroded	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.99	Shrink-swell	0.18	Depth to saturated zone	0.53
				Depth to saturated zone	0.53		
7603:							
Sibleyville	90	Fair		Poor		Fair	
		Low content of organic matter	0.32	Depth to bedrock	0.00	Rock fragments	0.01
				Shrink-swell	0.99	Depth to bedrock	0.97
		Depth to bedrock	0.97				
		Too acid	0.97				
7608:							
Steinauer	90	Fair		Poor		Poor	
		Low content of organic matter	0.08	Low strength	0.00	Slope	0.00
				Slope	0.68		
				Shrink-swell	0.87		
7656:							
Vinland variant	90	Fair		Poor		Poor	
		Depth to bedrock	0.10	Depth to bedrock	0.00	Slope	0.00
		Droughty	0.89			Depth to bedrock	0.10

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7681:							
Wymore---------------	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Water erosion	0.90	Shrink-swell	0.02	Depth to saturated zone	0.53
		Too acid	0.92	Depth to saturated zone	0.53		
7684:							
Wymore---------------	95	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.92	Shrink-swell	0.02	Depth to saturated zone	0.53
		Water erosion	0.99	Depth to saturated zone	0.53		
7688:							
Wymore---------------	45	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.92	Shrink-swell	0.02	Depth to saturated zone	0.53
		Water erosion	0.99	Depth to saturated zone	0.53		
Baileyville---------	40	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Shrink-swell	0.06	Depth to saturated zone	0.53
		Water erosion	0.90	Depth to saturated zone	0.53		
		Too acid	0.92				
7851:							
Judson---------------	95	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
		Water erosion	0.90	Shrink-swell	0.88		
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water----------------	100	Not rated		Not rated		Not rated	

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4020:							
Chase	89	Not limited		Somewhat limited		Very limited	
				Depth to saturated zone	0.43	No ground water	1.00
				Hard to pack	0.25		
4525:							
Benfield	90	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.02	Thin layer	0.61	No ground water	1.00
				Hard to pack	0.46		
4590:							
Clime	50	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.04	Hard to pack	0.70	No ground water	1.00
		Slope	0.01	Thin layer	0.70		
Sogn	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
4710:							
Kipson	85	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.50	Thin layer	1.00	No ground water	1.00
		Slope	0.03				
4725:							
Kipson	60	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.50	Piping	0.09	No ground water	1.00
		Slope	0.08				
Sogn	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	No ground water	1.00
		Slope	0.01				
4830:							
Wamego	85	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.19	Thin layer	0.93	No ground water	1.00
				Hard to pack	0.12		
4831:							
Wamego	85	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.19	Thin layer	0.93	No ground water	1.00
		Slope	0.02	Hard to pack	0.12		
7010:							
Calco	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Cutbanks cave	0.10
7050:							
Kennebec	95	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.14	Depth to water	0.54
				Depth to saturated zone	0.09	Slow refill	0.30
						Cutbanks cave	0.10

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7051:							
Kennebec------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.15	Depth to water	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
7090:							
Wabash--------------	91	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.77		
7170:							
Reading-------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.57			No ground water	1.00
7171:							
Reading-------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.57			No ground water	1.00
7206:							
Aksarben------------	87	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			No ground water	1.00
7207:							
Aksarben------------	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			No ground water	1.00
7220:							
Burchard------------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.05	Piping	0.01	No ground water	1.00
7224:							
Burchard------------	63	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.05	Piping	0.01	No ground water	1.00
Steinauer-----------	27	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			No ground water	1.00
7225:							
Burchard------------	55	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			No ground water	1.00
		Slope	0.03				
Steinauer-----------	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.05	Piping	0.01	No ground water	1.00
		Slope	0.03				
7233:							
Elmont--------------	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.05	Thin layer	0.26	No ground water	1.00
		Depth to bedrock	0.01				
7301:							
Martin--------------	85	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.70		

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7424:							
Morrill, eroded-----	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			No ground water	1.00
7433:							
Morrill-------------	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			No ground water	1.00
7435:							
Morrill-------------	100	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.50	Piping	0.76	No ground water	1.00
7436:							
Morrill, eroded-----	87	Very limited		Not limited		Very limited	
		Seepage	1.00			No ground water	1.00
7455:							
Olmitz--------------	91	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.07	No ground water	1.00
7470:							
Padonia-------------	50	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			No ground water	1.00
		Depth to bedrock	0.02				
Martin--------------	40	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.70		
7500:							
Pawnee--------------	90	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.40		
7502:							
Pawnee--------------	90	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.44		
7510:							
Pawnee, eroded------	85	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.51		
7603:							
Sibleyville---------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.62	No ground water	1.00
		Depth to bedrock	0.02	Thin layer	0.61		
7608:							
Steinauer-----------	90	Somewhat limited		Not limited		Very limited	
		Slope	0.10			No ground water	1.00
		Seepage	0.05				

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7656:							
Vinland variant-----	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	No ground water	1.00
		Depth to bedrock	0.30	Thin layer	0.98		
		Slope	0.03				
7681:							
Wymore--------------	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.05	Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.28		
7684:							
Wymore--------------	95	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.05	Depth to saturated zone	1.00	Slow refill	0.95
						Cutbanks cave	0.10
				Hard to pack	0.35	Depth to water	0.01
7688:							
Wymore--------------	45	Somewhat limited		Very limited		Very limited	
		Seepage	0.05	Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.35		
Baileyville---------	40	Somewhat limited		Very limited		Very limited	
		Seepage	0.05	Depth to saturated zone	1.00	No ground water	1.00
				Hard to pack	0.55		
7851:							
Judson--------------	95	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	No ground water	1.00
9971:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9983:							
Gravel pits and quarries-----------	100	Not rated		Not rated		Not rated	
9986:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
9999:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 16.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
4020:												
Chase	0-8	Silty clay loam, silt loam	CH, CL	A-7	0	0	100	100	95-100	90-100	40-54	17-25
	8-17	Silty clay loam, silt loam	CL, CH	A-7	0	0	100	100	95-100	90-100	40-52	17-25
	17-37	Silty clay, silty clay loam	CL, CH	A-7	0	0	100	100	95-100	90-100	48-70	25-40
	37-42	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	95-100	90-100	47-59	25-33
	42-60	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	90-100	41-55	21-30
4525:												
Benfield	0-6	Silty clay loam, gravelly silty clay loam	CL, CH	A-6, A-7	0	0-14	84-100	67-100	64-100	60-98	39-53	19-25
	6-19	Silty clay, silty clay loam, clay, gravelly silty clay	CH, CL, SC	A-7	0	0-11	68-100	31-100	28-100	28-100	47-64	25-36
	19-37	Silty clay, clay, silty clay loam, gravelly silty clay	CH, CL, SC	A-7	0	0-3	69-100	34-100	31-100	30-100	46-62	25-36
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
4590:												
Clime	0-9	Silty clay, silty clay loam	CH, CL	A-7	0	0-5	90-100	90-100	85-100	80-95	47-63	25-32
	9-22	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	95-100	95-100	95-100	85-95	49-73	27-44
	22-35	Silty clay, clay	CH	A-7	0	0	95-100	95-100	95-100	85-95	50-70	29-44
	35-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Sogn	0-12	Silty clay loam	CH, CL	A-6, A-7	0	0-10	85-100	85-100	85-100	70-100	39-51	19-25
	12-16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
4710:												
Kipson----------	0-9	Silty clay loam	CL	A-6, A-7-6	0	0-19	81-100	51-100	49-100	48-100	39-49	19-25
	9-19	Gravelly silty clay loam, silty clay loam, gravelly silt loam, silt loam, loam	CL, SC	A-6, A-7-6	0	0-19	81-100	57-100	49-100	45-98	30-47	12-25
	19-23	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
4725:												
Kipson----------	0-8	Silty clay loam, silt loam	CL, CH	A-6, A-7	0	0-7	92-100	85-100	80-100	77-100	37-51	17-25
	8-19	Channery silty clay loam, silty clay loam, channery silt loam, silt loam, channery loam, loam	CL	A-6, A-7	0	0-19	81-100	57-100	50-100	49-100	29-47	12-25
	19-22	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Sogn------------	0-12	Silty clay loam, channery silty clay loam	CL, CH	A-6, A-7	0	0-10	85-100	85-100	85-100	70-100	39-51	19-25
	12-16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
4830:												
Wamego----------	0-6	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	87-93	38-48	16-21
	6-10	Silty clay loam	CL, CH	A-6, A-7	0	0	100	100	94-100	86-94	39-51	19-25
	10-27	Silty clay loam, silty clay, clay loam	CL, CH	A-7	0	0	100	86-100	80-100	75-94	46-55	25-30
	27-31	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
4831:												
Wamego----------	0-6	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	87-93	38-48	16-21
	6-10	Silty clay loam	CL, CH	A-6, A-7	0	0	100	100	94-100	86-94	39-51	19-25
	10-27	Silty clay loam, silty clay, clay loam	CH, CL	A-7	0	0	100	86-100	80-100	75-94	46-55	25-30
	27-31	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7010:												
Calco-----------	0-17	Silty clay loam, silt loam	CH, CL	A-7, A-6	0	0	100	100	95-100	85-100	39-56	15-23
	17-60	Silty clay loam, loam, clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	80-100	33-45	15-23
7050:												
Kennebec--------	0-10	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	37-49	15-18
	10-36	Silt loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	37-46	15-19
	36-48	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	33-44	15-21
	48-60	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	33-42	15-21
7051:												
Kennebec--------	0-8	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	37-53	15-21
	8-30	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	37-51	15-21
	30-41	Silt loam, silty clay loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	33-43	15-21
	41-60	Silty clay loam, silt loam, clay loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	33-42	15-21
7090:												
Wabash----------	0-6	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	46-59	21-29
	6-16	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-59	21-29
	16-52	Silty clay, clay	CH	A-7	0	0	100	100	100	95-100	52-74	29-44
	52-70	Silty clay, clay	CH	A-7	0	0	100	100	100	95-100	51-72	29-44
7170:												
Reading---------	0-10	Silt loam	CL	A-6, A-7-6	0	0	100	100	98-100	90-97	33-48	12-21
	10-15	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	98-100	90-97	34-46	13-21
	15-35	Silty clay loam	CL	A-7-6	0	0	100	100	98-100	85-98	42-49	21-25
	35-41	Silty clay loam	CL	A-7-6	0	0	100	100	98-100	85-98	41-48	21-25
	41-60	Silty clay loam, clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	98-100	90-95	41-56	21-33

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
7171:												
Reading---------	0-9	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	80-90	35-47	13-19
	9-18	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	80-90	35-47	13-19
	18-48	Silty clay loam	CL, CH	A-6, A-7	0	0	100	100	95-100	85-95	38-51	19-25
	48-54	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	38-49	19-25
	54-80	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	95-100	80-95	35-46	17-25
7206:												
Aksarben--------	0-6	Silty clay loam, silt loam	CL, CH	A-7, A-6	0	0	100	100	95-100	90-100	39-54	17-25
	6-12	Silty clay loam, silt loam	CL, CH	A-7, A-6	0	0	100	100	95-100	90-100	39-52	17-25
	12-42	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	90-100	47-57	25-30
	42-60	Silty clay loam	CL	A-7, A-6	0	0	100	100	95-100	90-100	39-49	19-25
	60-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-44	17-23
7207:												
Aksarben--------	0-6	Silty clay loam, silt loam	CL, CH	A-6, A-7	0	0	100	100	95-100	90-100	39-54	17-25
	6-10	Silty clay loam, silt loam	CL, CH	A-6, A-7	0	0	100	100	95-100	90-100	39-52	17-25
	10-40	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	90-100	47-57	25-30
	40-60	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	39-49	19-25
	60-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-44	17-23
7220:												
Burchard--------	0-9	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-49	13-21
	9-13	Clay loam, loam	CL	A-7, A-6	0	0-5	95-100	95-100	85-95	60-80	39-49	17-24
	13-19	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	65-80	38-49	19-27
	19-29	Clay loam	CL	A-7, A-6	0	0-5	95-100	85-100	75-95	65-80	38-49	19-27
	29-37	Clay loam, loam	CL	A-7, A-6	0	0-5	95-100	85-100	75-95	65-80	31-42	13-21
	37-60	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	30-41	13-21
7224:												
Burchard--------	0-7	Clay loam	CL	A-7	---	0-5	95-100	95-100	85-95	60-80	41-49	19-22
	7-22	Clay loam	CL	A-7	---	0-5	95-100	90-100	85-95	65-80	42-49	21-25
	22-37	Clay loam	CL	A-7, A-6	---	0-5	95-100	90-100	85-95	60-80	38-47	19-25
	37-60	Clay loam	CL	A-7, A-6	---	0-5	95-100	90-100	85-95	60-80	37-47	19-25
Steinauer-------	0-6	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	35-47	16-23
	6-13	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	34-47	16-25
	13-60	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	34-46	16-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
7225:												
Burchard--------	0-9	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-95	60-80	35-49	13-21
	9-19	Clay loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	65-80	38-49	19-27
	19-29	Clay loam	CL	A-7, A-6	0	0-5	95-100	85-100	75-95	65-80	38-49	19-27
	29-37	Clay loam, loam	CL	A-7, A-6	0	0-5	95-100	85-100	75-95	65-80	31-42	13-21
	37-60	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	85-100	75-95	60-80	30-41	13-21
Steinauer-------	0-6	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	36-49	17-25
	6-14	Clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	70-90	38-47	19-25
	14-80	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	29-46	12-25
7233:												
Elmont----------	0-9	Silt loam, silty clay loam	CL	A-7, A-6	0	0	100	100	90-100	75-100	33-48	12-21
	9-26	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	39-49	19-25
	26-37	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	38-48	19-25
	37-45	Silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	38-47	19-25
	45-49	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7301:												
Martin----------	0-6	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	42-58	19-28
	6-12	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	40-54	19-28
	12-53	Silty clay, clay	CH	A-7	0	0	100	100	90-100	75-95	52-70	29-40
	53-80	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	75-95	46-57	25-33
7424:												
Morrill, eroded-	0-6	Clay loam, loam	CL	A-6, A-7	0	0	95-100	71-100	58-95	43-75	37-48	17-22
	6-27	Clay loam, sandy clay loam, gravelly clay loam	CL, SC	A-7-6, A-6	0	0	86-100	60-100	51-93	39-73	38-49	19-25
	27-41	Clay loam, sandy clay loam, gravelly clay loam	CL, SC	A-6, A-7-6	0	0	86-100	60-100	51-95	38-73	37-48	17-25
	41-60	Sandy clay loam, clay loam, gravelly sandy clay loam, gravelly	CL, SC	A-6, A-7-6	0	0	86-100	60-100	58-100	38-70	36-44	17-23

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
7433:												
Morrill---------	0-10	Loam, clay loam	CL	A-4, A-6, A-7	0	0	95-100	71-100	58-95	43-75	28-48	9-20
	10-29	Clay loam, sandy clay loam, gravelly clay loam	CL, SC	A-7-6, A-6	0	0	86-100	60-100	51-93	39-73	38-49	19-25
	29-41	Clay loam, sandy clay loam, gravelly clay loam	CL, SC	A-6, A-7-6	0	0	86-100	60-100	51-95	38-73	37-48	17-25
	41-60	Sandy clay loam, clay loam, gravelly sandy clay loam, gravelly clay loam	CL, SC	A-6, A-7-6	0	0	86-100	60-100	58-100	38-70	36-44	17-23
7435:												
Morrill---------	0-12	Loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	75-100	65-100	50-80	25-35	7-15
	12-40	Clay loam, sandy clay loam, gravelly clay loam	CL, SC	A-6, A-7-6	0	0	85-100	70-100	55-100	25-80	30-45	11-25
	40-60	Loam, clay loam, sandy clay loam	CL, ML, SC, SM	A-2, A-4, A-6	0	0	90-100	70-100	45-100	20-80	20-35	2-15
7436:												
Morrill, eroded-	0-6	Loam, clay loam	CL	A-6, A-4, A-7	0	0	95-100	75-100	65-100	50-80	28-44	9-19
	6-12	Clay loam, loam	CL	A-7, A-6	0	0	95-100	75-100	65-100	50-80	34-46	15-22
	12-22	Loam, sandy clay loam, gravelly clay loam, gravelly sandy clay loam, clay loam	CL, SC	A-7, A-6	0	0	85-100	70-100	55-100	25-80	33-47	15-25
	22-43	Clay loam, sandy clay loam, gravelly clay loam, gravelly sandy clay loam	CL, SC	A-7, A-6	0	0	85-100	70-100	55-100	25-80	33-47	15-25
	43-80	Loam, fine sandy loam, clay loam, sandy clay loam, sandy loam, gravelly sandy clay loam, gravelly sandy loam, gravelly clay loam, stratified fine sandy loam to loamy fine sand to sand	SC-SM, SC, CL-ML, CL	A-4, A-6, A-2-4	0	0	90-100	70-100	45-85	25-55	0-42	NP-21

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7455:												
Olmitz----------	0-6	Loam, clay loam	CL	A-6, A-7	0	0	100	90-100	85-95	60-80	37-48	15-21
	6-25	Loam, clay loam	CL	A-7, A-6	0	0	100	90-100	85-95	60-80	37-48	15-21
	25-44	Clay loam, loam	CL	A-6, A-7	0	0	100	90-100	85-95	60-80	36-46	16-21
	44-60	Clay loam, loam	CL	A-7, A-6	0	0	100	90-100	85-95	60-80	35-44	16-21
7470:												
Padonia---------	0-11	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	80-95	41-53	19-25
	11-22	Silty clay, silty clay loam, clay	CH, CL	A-7	0	0	100	100	95-100	90-95	47-64	25-36
	22-32	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-95	46-63	25-36
	32-37	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	80-95	42-52	23-29
	37-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Martin----------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	95-100	85-95	42-58	19-28
	6-12	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	40-54	19-28
	12-53	Silty clay, clay	CH	A-7	0	0	100	100	90-100	75-95	52-70	29-40
	53-80	Silty clay, clay, silty clay loam	CL, CH	A-7	0	0	100	100	95-100	75-95	46-57	25-33
7500:												
Pawnee----------	0-8	Clay loam	CL, CH	A-7	0	0	95-100	95-100	85-100	70-90	44-56	21-27
	8-15	Clay loam, clay	CH, CL	A-7	0	0	95-100	95-100	85-100	70-90	42-58	21-30
	15-41	Clay	CH	A-7	0	0	95-100	95-100	85-100	70-85	50-64	29-36
	41-51	Clay, clay loam	CL, CH	A-7	0	0	95-100	95-100	85-100	70-85	46-58	25-33
	51-60	Clay loam, sandy clay loam	CL	A-6, A-7	0	0	95-100	95-100	80-100	70-90	35-49	17-27
7502:												
Pawnee----------	0-7	Clay loam	CL, CH	A-7	0	0	95-100	95-100	85-100	70-90	44-56	21-27
	7-12	Clay loam, clay	CL, CH	A-7	0	0	95-100	95-100	85-100	70-90	42-58	21-30
	12-41	Clay	CH	A-7	0	0	95-100	95-100	85-100	70-85	50-64	29-36
	41-51	Clay, clay loam	CH, CL	A-7	0	0	95-100	95-100	85-100	70-85	46-58	25-33
	51-60	Clay loam, sandy clay loam	CL	A-6, A-7	0	0	95-100	95-100	80-100	70-90	35-49	17-27
7510:												
Pawnee, eroded--	0-6	Clay, clay loam	CL, CH	A-7	0	0	95-100	95-100	85-100	70-90	47-57	25-30
	6-39	Clay	CH	A-7	0	0	95-100	95-100	85-100	70-85	50-64	29-36
	39-51	Clay, clay loam	CH, CL	A-7	0	0	95-100	95-100	85-100	70-85	46-58	25-33
	51-60	Clay loam, sandy clay loam	CL	A-6, A-7	0	0	95-100	95-100	80-100	70-90	35-49	17-27

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7603:												
Sibleyville-----	0-9	Loam	CL	A-4, A-6, A-7	0	0	100	84-100	70-95	51-73	29-46	9-19
	9-14	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0	0	100	84-100	72-98	53-76	32-46	13-22
	14-23	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0	0	100	84-100	71-99	52-77	32-49	13-25
	23-37	Channery loam, channery clay loam, channery sandy clay loam	CL, SC	A-2-4, A-4, A-6	0	0-15	72-91	54-91	44-87	31-65	26-40	10-20
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7608:												
Steinauer-------	0-6	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	35-47	16-23
	6-13	Clay loam, loam	CL	A-6, A-7	0	0-5	95-100	95-100	85-100	55-90	34-47	16-25
	13-60	Loam, clay loam	CL	A-6, A-7	0	0-5	95-100	95-100	90-100	60-75	34-46	16-25
7656:												
Vinland variant-	0-8	Loam	CL, CL-ML	A-4	0	0	95-100	90-100	85-100	85-100	20-30	5-10
	8-24	Loam, silt loam	CL, CL-ML	A-4	0	0	95-100	90-100	85-100	80-90	20-30	5-10
	24-29	Loam, silt loam	CL, CL-ML	A-4	0	0	95-100	90-100	85-100	80-90	20-30	5-10
	29-33	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7681:												
Wymore----------	0-8	Silty clay loam, silt loam	CH, CL	A-7	0	0	100	100	90-100	70-95	41-57	18-27
	8-11	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	45-57	23-29
	11-37	Silty clay	CH	A-7	0	0	100	100	95-100	90-95	53-69	29-40
	37-45	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	47-59	25-33
	45-51	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	95-100	85-95	43-53	23-29
	51-79	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	90-100	70-95	36-48	17-26
7684:												
Wymore----------	0-6	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	46-61	23-31
	6-34	Silty clay	CH	A-7	0	0	100	100	95-100	90-95	54-69	31-40
	34-42	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	47-59	25-33
	42-53	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	43-53	23-29
	53-79	Silty clay loam, silt loam	CL	A-7, A-6	0	0	100	100	90-100	70-95	36-48	17-26

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
7688:												
Wymore----------	0-6	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	46-61	23-31
	6-34	Silty clay	CH	A-7	0	0	100	100	95-100	90-95	54-69	31-40
	34-42	Silty clay, silty clay loam	CL, CH	A-7	0	0	100	100	95-100	85-95	47-59	25-33
	42-53	Silty clay loam, silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	43-53	23-29
	53-79	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	70-95	36-48	17-26
Baileyville-----	0-6	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	44-63	23-32
	6-19	Silty clay	CH	A-7	0	0	100	100	95-100	90-95	53-70	29-40
	19-32	Silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-95	47-59	25-33
	32-36	Silty clay loam	CL	A-7, A-6	0	0	100	100	95-100	85-95	39-49	19-25
	36-43	Silty clay loam, silty clay	CL, CH	A-7	0	0	100	100	95-100	85-95	41-57	21-33
	43-48	Clay loam, clay, silty clay	CL, CH	A-7	0	0	95-100	95-100	86-100	66-95	40-57	21-33
	48-76	Clay, silty clay, clay loam	CH, CL	A-7	---	0	95-100	95-100	86-100	66-95	45-71	25-44
7851:												
Judson----------	0-7	Silt loam	CL	A-7	0	0	100	100	100	95-100	43-48	16-18
	7-25	Silt loam, silty clay loam	CL	A-7	0	0	100	100	100	95-100	42-48	17-21
	25-40	Silty clay loam	CL	A-7	0	0	100	100	100	95-100	41-48	19-22
	40-50	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	39-49	19-25
	50-80	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-44	17-23
9971. Arents, earthen dam												
9983. Gravel pits and quarries												
9986. Miscellaneous water												
9999. Water												

Table 17.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
4020:														
Chase------------	0-8	1-10	50-70	25-35	1.30-1.45	0.2-0.6	0.21-0.23	4.1-6.7	2.0-4.0	.37	.37	5	7	38
	8-17	1-10	50-70	25-35	1.30-1.45	0.2-0.6	0.21-0.23	4.1-6.7	2.0-3.0	.37	.37			
	17-37	1-10	35-65	35-55	1.35-1.45	0.06-0.2	0.11-0.18	6.7-10.4	1.0-2.5	.28	.28			
	37-42	1-10	35-65	35-45	1.35-1.45	0.06-0.2	0.11-0.18	6.7-9.2	0.5-1.5	.28	.28			
	42-60	1-10	35-65	30-42	1.35-1.45	0.06-0.2	0.11-0.18	5.4-8.4	0.2-1.0	.28	.28			
4525:														
Benfield---------	0-6	1-10	50-65	27-35	1.30-1.40	0.2-0.6	0.21-0.24	4.1-5.9	1.0-4.0	.37	.43	3	7	38
	6-19	1-10	35-60	35-50	1.35-1.45	0.06-0.2	0.11-0.20	6.0-8.9	1.0-2.0	.37	.55			
	19-37	1-10	35-60	35-50	1.35-1.45	0.06-0.2	0.11-0.20	6.0-8.9	0.5-1.0	.37	.49			
	37-41	---	---	---	---	---	---	---	---	---	---			
4590:														
Clime------------	0-9	5-15	40-50	35-45	1.35-1.45	0.06-0.2	0.12-0.14	5.8-7.9	1.0-4.0	.28	.28	3	4	86
	9-22	5-15	35-50	38-60	1.35-1.50	0.06-0.2	0.12-0.18	6.4-10.4	0.7-2.0	.28	.28			
	22-35	5-15	30-50	40-60	1.40-1.50	0.06-0.2	0.10-0.14	6.8-10.4	0.2-0.6	.32	.32			
	35-39	---	---	---	---	---	---	---	---	---	---			
Sogn-------------	0-12	1-20	50-70	27-35	1.15-1.20	0.6-2	0.17-0.22	3.0-5.9	1.0-3.0	.32	.32	1	4L	86
	12-16	---	---	---	---	---	---	---	---	---	---			
4710:														
Kipson-----------	0-9	1-20	50-70	27-35	1.30-1.40	0.6-2	0.17-0.20	3.0-5.9	1.0-3.0	.32	.49	2	4L	86
	9-19	1-20	40-70	18-35	1.35-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-1.0	.32	.43			
	19-23	---	---	---	---	---	---	---	---	---	---			
4725:														
Kipson-----------	0-8	2-30	45-70	25-35	1.30-1.40	0.6-2	0.17-0.20	3.7-5.8	1.0-3.0	.32	.49	2	4L	86
	8-19	2-30	45-75	18-35	1.35-1.50	0.6-2	0.15-0.20	2.2-5.8	0.5-1.0	.32	.43			
	19-22	---	---	---	---	---	---	---	---	---	---			
Sogn-------------	0-12	2-20	55-75	27-35	1.35-1.45	0.6-2	0.21-0.23	4.1-5.8	1.0-3.0	.32	.32	1	4L	86
	12-16	---	---	---	---	---	---	---	---	---	---			
4830:														
Wamego-----------	0-6	1-15	50-70	24-30	1.30-1.50	0.6-2	0.21-0.24	3.0-4.7	2.0-4.0	.32	.32	3	6	48
	6-10	1-15	50-70	27-35	1.30-1.50	0.6-2	0.21-0.24	3.0-5.8	1.0-3.0	.32	.32			
	10-27	1-25	40-60	35-42	1.50-1.70	0.06-0.2	0.12-0.20	6.0-7.2	0.5-1.5	.43	.43			
	27-31	---	---	---	---	---	---	---	---	---	---			
4831:														
Wamego-----------	0-6	1-15	50-70	24-30	1.30-1.50	0.6-2	0.21-0.24	3.0-4.7	2.0-4.0	.32	.32	3	6	48
	6-10	1-15	50-70	27-35	1.30-1.50	0.6-2	0.21-0.24	3.0-5.8	1.0-3.0	.32	.32			
	10-27	1-25	40-60	35-42	1.50-1.70	0.06-0.2	0.12-0.20	6.0-7.2	0.5-1.5	.43	.43			
	27-31	---	---	---	---	---	---	---	---	---	---			
7010:														
Calco------------	0-17	1-10	50-70	22-33	1.25-1.30	0.6-2	0.21-0.23	3.0-5.4	3.0-6.0	.28	.28	5	4L	86
	17-60	5-30	30-65	22-32	1.30-1.45	0.6-2	0.18-0.20	3.0-5.4	0.2-1.5	.28	.28			
7050:														
Kennebec---------	0-10	1-10	50-75	22-27	1.25-1.35	0.6-2	0.22-0.24	3.0-4.1	2.0-5.0	.28	.28	5	6	48
	10-36	1-10	50-75	22-27	1.35-1.40	0.6-2	0.20-0.22	3.0-4.1	2.0-4.0	.28	.28			
	36-48	1-10	50-75	22-30	1.35-1.40	0.6-2	0.20-0.22	3.0-4.7	0.5-2.0	.43	.43			
	48-60	1-10	50-75	22-30	1.35-1.40	0.6-2	0.20-0.22	3.0-4.7	0.2-1.0	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
7051:														
Kennebec---------	0-8	1-10	50-75	22-30	1.25-1.35	0.6-2	0.22-0.24	3.0-4.7	2.0-6.0	.28	.28	5	6	48
	8-30	1-10	50-75	22-30	1.25-1.35	0.6-2	0.22-0.24	3.0-4.7	2.0-5.0	.28	.28			
	30-41	1-10	40-70	22-30	1.35-1.40	0.6-2	0.20-0.22	3.0-4.7	0.5-1.5	.43	.43			
	41-60	1-25	40-70	22-30	1.35-1.40	0.6-2	0.20-0.22	3.0-4.7	0.2-0.8	.43	.43			
7090:														
Wabash-----------	0-6	1-10	40-65	30-40	1.25-1.45	0.0015-0.06	0.21-0.23	5.4-7.9	2.5-4.0	.28	.28	5	7	38
	6-16	1-10	40-65	30-40	1.25-1.45	0.0015-0.06	0.18-0.20	5.4-7.9	2.0-4.0	.28	.28			
	16-52	1-10	30-60	40-60	1.20-1.45	0.0015-0.06	0.08-0.12	7.9-12.0	0.5-2.0	.28	.28			
	52-70	1-10	30-60	40-60	1.20-1.45	0.0015-0.06	0.08-0.12	7.9-12.0	0.2-0.8	.28	.28			
7170:														
Reading----------	0-10	1-10	50-75	18-30	1.35-1.40	0.6-2	0.22-0.24	2.2-4.1	2.0-4.0	.32	.32	5	6	48
	10-15	1-10	50-75	20-30	1.35-1.40	0.6-2	0.22-0.24	2.2-4.1	2.0-3.0	.32	.32			
	15-35	1-10	45-70	30-35	1.40-1.50	0.2-2	0.18-0.20	4.7-5.8	1.0-2.0	.43	.43			
	35-41	1-10	45-70	30-35	1.40-1.50	0.2-2	0.18-0.20	4.7-5.8	0.5-1.5	.43	.43			
	41-60	1-30	40-60	30-45	1.40-1.50	0.2-2	0.13-0.20	4.7-7.9	0.2-0.8	.43	.43			
7171:														
Reading----------	0-9	2-10	70-80	20-28	1.35-1.40	0.6-2	0.22-0.24	2.6-4.3	2.0-4.0	.32	.32	5	6	48
	9-18	2-10	70-80	20-28	1.35-1.40	0.6-2	0.22-0.24	2.6-4.3	2.0-4.0	.32	.32			
	18-48	2-8	60-70	27-35	1.40-1.50	0.2-2	0.18-0.20	4.1-5.8	0.5-3.0	.43	.43			
	48-54	2-8	60-70	27-35	1.40-1.50	0.2-2	0.18-0.20	4.1-5.8	0.5-2.0	.43	.43			
	54-80	2-22	40-65	25-35	1.40-1.50	0.2-2	0.13-0.20	3.7-5.8	0.1-0.5	.43	.43			
7206:														
Aksarben---------	0-6	2-8	50-70	25-35	1.30-1.40	0.6-2	0.17-0.23	4.1-6.7	2.0-4.0	.32	.32	5	7	38
	6-12	2-8	50-70	25-35	1.30-1.40	0.6-2	0.17-0.23	4.1-6.7	1.5-3.0	.32	.32			
	12-42	2-8	40-70	35-42	1.20-1.45	0.2-0.6	0.16-0.18	6.7-8.4	0.8-2.0	.43	.43			
	42-60	2-8	50-70	27-35	1.30-1.40	0.6-2	0.18-0.20	4.6-6.7	0.5-1.5	.43	.43			
	60-80	2-8	50-80	24-32	1.30-1.40	0.6-2	0.18-0.20	4.1-5.9	0.2-0.8	.43	.43			
7207:														
Aksarben---------	0-6	2-8	50-70	25-35	1.30-1.40	0.6-2	0.17-0.23	4.1-6.7	2.0-4.0	.32	.32	5	7	38
	6-10	2-8	50-70	25-35	1.30-1.40	0.6-2	0.17-0.23	4.1-6.7	1.5-3.0	.32	.32			
	10-40	2-8	40-70	35-42	1.20-1.45	0.2-0.6	0.16-0.18	6.7-8.4	0.8-2.0	.43	.43			
	40-60	2-8	50-70	27-35	1.30-1.40	0.6-2	0.18-0.20	4.6-6.7	0.5-1.5	.43	.43			
	60-80	2-8	50-80	24-32	1.30-1.40	0.6-2	0.18-0.20	4.1-5.9	0.2-0.8	.43	.43			
7220:														
Burchard---------	0-9	20-45	25-60	20-30	1.15-1.40	0.2-0.6	0.17-0.19	2.6-4.7	2.0-4.0	.28	.28	5	6	48
	9-13	20-45	25-60	25-34	1.20-1.50	0.2-0.6	0.17-0.19	3.7-5.6	2.0-3.0	.28	.28			
	13-19	20-45	20-50	27-38	1.30-1.50	0.2-0.6	0.15-0.17	4.1-6.4	0.5-1.0	.37	.37			
	19-29	20-45	20-50	27-38	1.30-1.50	0.2-0.6	0.15-0.17	4.1-6.4	0.5-1.0	.37	.37			
	29-37	30-45	30-45	20-30	1.50-1.60	0.2-0.6	0.15-0.17	2.6-4.7	0.2-0.8	.37	.37			
	37-60	30-45	30-45	20-30	1.50-1.70	0.2-0.6	0.14-0.16	2.6-4.7	0.0-0.5	.37	.37			
7224:														
Burchard---------	0-7	20-45	25-45	27-32	1.20-1.40	0.2-0.6	0.17-0.19	4.1-5.9	2.0-4.0	.28	.28	5	6	48
	7-22	20-45	25-45	30-35	1.40-1.60	0.2-0.6	0.15-0.17	4.1-5.9	1.0-2.0	.32	.32			
	22-37	20-45	25-45	27-35	1.40-1.60	0.2-0.6	0.14-0.16	4.1-5.9	0.2-1.0	.32	.32			
	37-60	20-45	25-45	27-35	1.40-1.60	0.2-0.6	0.14-0.16	4.1-5.9	0.1-0.8	.37	.37			
Steinauer--------	0-6	20-45	36-50	24-32	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28	5	4L	86
	6-13	20-45	36-50	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.2-1.0	.32	.32			
	13-60	20-45	36-50	24-35	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.1-0.5	.32	.32			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
7225:														
Burchard---------	0-9	20-45	25-60	20-30	1.15-1.40	0.2-0.6	0.17-0.19	2.6-4.7	2.0-4.0	.28	.28	5	6	48
	9-19	20-45	20-50	27-38	1.30-1.50	0.2-0.6	0.15-0.17	4.1-6.4	0.5-1.0	.37	.37			
	19-29	20-45	20-50	27-38	1.30-1.50	0.2-0.6	0.15-0.17	4.1-6.4	0.5-1.0	.37	.37			
	29-37	30-45	30-45	20-30	1.50-1.60	0.2-0.6	0.15-0.17	2.6-4.7	0.2-0.8	.37	.37			
	37-60	30-45	30-45	20-30	1.50-1.70	0.2-0.6	0.14-0.16	2.6-4.7	0.0-0.5	.37	.37			
Steinauer--------	0-6	20-45	30-50	25-35	1.20-1.35	0.2-0.6	0.19-0.22	3.7-5.8	0.5-2.0	.32	.32	5	4L	86
	6-14	20-45	30-50	27-35	1.30-1.50	0.2-0.6	0.17-0.19	4.1-5.8	0.5-1.0	.37	.37			
	14-80	20-45	30-50	18-35	1.30-1.65	0.2-0.6	0.16-0.19	2.2-5.8	0.1-0.5	.37	.37			
7233:														
Elmont-----------	0-9	1-15	50-75	18-30	1.30-1.40	0.6-2	0.22-0.24	2.2-4.5	2.0-4.0	.32	.32	5	6	48
	9-26	1-25	45-70	27-35	1.30-1.45	0.2-0.6	0.18-0.20	4.1-5.9	1.0-2.0	.43	.43			
	26-37	1-25	45-70	27-35	1.30-1.45	0.2-0.6	0.18-0.20	4.1-5.9	0.5-1.5	.43	.43			
	37-45	1-25	45-70	27-35	1.30-1.45	0.2-0.6	0.18-0.20	4.1-5.9	0.2-0.8	.43	.43			
	45-49	---	---	---	---	---	---	---	---	---	---			
7301:														
Martin-----------	0-6	2-8	60-70	27-39	1.35-1.45	0.2-0.6	0.21-0.23	4.6-7.9	2.0-4.0	.37	.37	5	7	38
	6-12	2-8	55-70	27-39	1.35-1.45	0.2-0.6	0.18-0.20	4.6-7.9	1.0-2.0	.28	.28			
	12-53	2-8	38-60	40-55	1.20-1.30	0.06-0.2	0.12-0.18	7.9-12.0	0.5-2.0	.28	.28			
	53-80	2-8	38-65	35-45	1.20-1.30	0.06-0.2	0.12-0.18	6.7-9.2	0.1-0.8	.28	.28			
7424:														
Morrill, eroded--	0-6	20-45	15-52	25-32	1.30-1.40	0.6-2	0.14-0.21	3.7-5.1	1.0-3.0	.28	.28	5	6	48
	6-27	20-50	15-50	27-35	1.35-1.45	0.2-0.6	0.15-0.19	4.1-5.9	0.5-2.0	.28	.32			
	27-41	20-50	15-50	25-35	1.35-1.45	0.2-0.6	0.15-0.19	4.1-5.9	0.5-1.5	.28	.32			
	41-60	20-60	15-50	25-32	1.35-1.45	0.2-0.6	0.15-0.19	3.7-5.1	0.2-0.8	.28	.32			
7433:														
Morrill----------	0-10	20-45	15-52	15-29	1.30-1.40	0.6-2	0.14-0.21	1.6-4.5	1.0-4.0	.28	.28	5	6	48
	10-29	20-50	15-50	27-35	1.35-1.45	0.2-0.6	0.15-0.19	4.1-5.9	0.5-2.0	.28	.32			
	29-41	20-50	15-50	25-35	1.35-1.45	0.2-0.6	0.15-0.19	4.1-5.9	0.5-1.5	.28	.32			
	41-60	20-60	15-50	25-32	1.35-1.45	0.2-0.6	0.15-0.19	3.7-5.1	0.2-0.8	.28	.32			
7435:														
Morrill----------	0-12	---	---	15-27	1.30-1.65	0.6-2	0.15-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	12-40	---	---	18-35	1.35-1.70	0.2-0.6	0.12-0.19	3.0-5.9	0.2-1.0	.28	.32			
	40-60	---	---	10-29	1.40-1.55	0.2-2	0.15-0.18	0.0-2.9	0.0-0.5	.37	.43			
7436:														
Morrill, eroded--	0-6	25-45	20-50	15-28	1.30-1.40	0.6-2	0.14-0.21	1.6-4.3	1.0-3.0	.28	.28	5	6	48
	6-12	25-45	20-40	22-32	1.30-1.40	0.6-2	0.14-0.21	3.0-5.1	1.0-2.0	.28	.28			
	12-22	25-60	15-35	22-35	1.35-1.45	0.2-0.6	0.15-0.19	3.0-5.8	0.5-1.0	.32	.32			
	22-43	25-60	15-35	22-35	1.35-1.45	0.2-0.6	0.15-0.19	3.0-5.8	0.5-1.0	.32	.32			
	43-80	40-90	10-35	3-30	1.35-1.45	0.6-6	0.08-0.15	0.2-4.7	0.1-0.8	.20	.20			
7455:														
Olmitz-----------	0-6	20-60	25-50	22-30	1.40-1.45	0.6-2	0.19-0.21	3.0-4.7	2.0-4.0	.24	.24	5	6	48
	6-25	20-60	25-50	22-30	1.40-1.45	0.6-2	0.19-0.21	3.0-4.7	2.0-4.0	.24	.24			
	25-44	20-60	25-50	24-30	1.40-1.45	0.6-2	0.19-0.21	3.0-4.7	1.0-3.0	.28	.28			
	44-60	20-60	25-50	24-30	1.40-1.45	0.6-2	0.19-0.21	3.0-4.7	0.5-2.0	.28	.28			
7470:														
Padonia----------	0-11	2-10	50-70	27-35	1.30-1.40	0.6-2	0.21-0.23	4.1-5.9	2.0-4.0	.37	.37	3	7	38
	11-22	2-10	35-60	35-50	1.20-1.40	0.06-0.2	0.11-0.18	6.0-8.9	1.0-2.0	.32	.32			
	22-32	2-10	35-60	35-50	1.20-1.40	0.06-0.2	0.11-0.18	6.0-8.9	0.5-1.5	.32	.32			
	32-37	2-10	45-60	32-40	1.30-1.40	0.2-0.6	0.18-0.20	5.1-6.8	0.1-1.0	.43	.43			
	37-40	---	---	---	---	---	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
7470:														
Martin-----------	0-6	2-8	60-70	27-39	1.35-1.45	0.2-0.6	0.21-0.23	4.6-7.9	2.0-4.0	.37	.37	5	7	38
	6-12	2-8	55-70	27-39	1.35-1.45	0.2-0.6	0.18-0.20	4.6-7.9	1.0-2.0	.28	.28			
	12-53	2-8	38-60	40-55	1.20-1.30	0.06-0.2	0.12-0.18	7.9-12.0	0.5-2.0	.28	.28			
	53-80	2-8	38-65	35-45	1.20-1.30	0.06-0.2	0.12-0.18	6.7-9.2	0.1-0.8	.28	.28			
7500:														
Pawnee-----------	0-8	20-45	20-50	30-38	1.40-1.50	0.2-0.6	0.17-0.19	4.3-6.4	2.0-4.0	.37	.37	5	6	48
	8-15	20-45	20-50	30-42	1.40-1.50	0.2-0.6	0.17-0.19	4.3-7.2	1.0-3.0	.37	.37			
	15-41	15-40	15-40	40-50	1.50-1.70	0.06-0.2	0.09-0.11	6.0-8.9	0.5-2.0	.37	.37			
	41-51	15-40	15-40	35-45	1.50-1.70	0.06-0.2	0.09-0.11	6.0-7.9	0.5-1.5	.37	.37			
	51-60	20-55	20-50	25-38	1.40-1.50	0.06-0.2	0.14-0.16	3.7-6.4	0.1-0.5	.37	.37			
7502:														
Pawnee-----------	0-7	20-45	20-50	30-38	1.40-1.50	0.2-0.6	0.17-0.19	4.3-6.4	2.0-4.0	.37	.37	5	6	48
	7-12	20-45	20-50	30-42	1.40-1.50	0.2-0.6	0.17-0.19	4.3-7.2	1.0-3.0	.37	.37			
	12-41	15-40	15-40	40-50	1.50-1.70	0.06-0.2	0.09-0.11	6.0-8.9	0.5-2.0	.37	.37			
	41-51	15-40	15-40	35-45	1.50-1.70	0.06-0.2	0.09-0.11	6.0-7.9	0.5-1.5	.37	.37			
	51-60	20-55	20-50	25-38	1.40-1.50	0.06-0.2	0.14-0.16	3.7-6.4	0.1-0.5	.37	.37			
7510:														
Pawnee, eroded---	0-6	20-45	20-50	36-42	1.40-1.50	0.2-0.6	0.17-0.19	4.3-7.2	1.5-3.0	.37	.37	5	4	86
	6-39	15-40	15-40	40-50	1.50-1.70	0.06-0.2	0.09-0.11	6.0-8.9	0.5-2.0	.37	.37			
	39-51	15-40	15-40	35-45	1.50-1.70	0.06-0.2	0.09-0.11	6.0-7.9	0.5-1.5	.37	.37			
	51-60	20-55	20-50	25-38	1.40-1.50	0.06-0.2	0.14-0.16	3.7-6.4	0.1-0.5	.37	.37			
7603:														
Sibleyville------	0-9	25-52	28-50	15-27	1.30-1.40	0.6-2	0.18-0.21	1.6-4.1	1.5-4.0	.28	.28	3	6	48
	9-14	20-60	10-50	20-32	1.35-1.45	0.6-2	0.16-0.19	2.6-5.1	1.0-2.0	.28	.28			
	14-23	20-60	10-50	20-35	1.35-1.45	0.6-2	0.16-0.19	2.6-5.8	0.8-1.8	.32	.32			
	23-37	20-60	10-50	15-29	1.35-1.50	0.6-2	0.12-0.15	1.6-4.5	0.2-0.6	.20	.32			
	37-41	---	---	---	---	---	---	---	---	---	---			
7608:														
Steinauer--------	0-6	20-45	36-50	24-32	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28	5	4L	86
	6-13	20-45	36-50	24-35	1.30-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.2-1.0	.32	.32			
	13-60	20-45	36-50	24-35	1.50-1.80	0.2-0.6	0.14-0.19	3.0-5.9	0.1-0.5	.32	.32			
7656:														
Vinland variant--	0-8	25-50	28-50	12-18	1.30-1.40	0.6-2	0.22-0.24	0.9-2.2	2.0-4.0	.32	.32	3	5	56
	8-24	10-50	35-60	12-18	1.35-1.45	0.6-2	0.19-0.22	0.9-2.2	1.0-2.0	.32	.32			
	24-29	10-50	35-60	12-18	1.35-1.45	0.6-2	0.19-0.22	0.9-2.2	0.1-0.8	.32	.32			
	29-33	---	---	---	---	---	---	---	---	---	---			
7681:														
Wymore-----------	0-8	1-3	50-70	26-38	1.25-1.45	0.2-0.6	0.21-0.24	4.4-7.4	2.0-4.0	.37	.37	5	7	38
	8-11	1-3	50-70	32-40	1.25-1.45	0.2-0.6	0.12-0.23	5.9-7.9	1.0-3.0	.37	.37			
	11-37	1-3	45-70	40-55	1.20-1.50	0.06-0.2	0.11-0.13	7.9-11.4	1.0-2.0	.28	.28			
	37-45	1-3	40-70	35-45	1.20-1.50	0.06-0.2	0.10-0.20	6.7-9.2	0.5-1.5	.43	.43			
	45-51	1-3	40-70	32-40	1.25-1.45	0.2-0.6	0.18-0.20	5.9-7.9	0.2-1.0	.43	.43			
	51-79	1-5	40-70	25-36	1.25-1.45	0.2-0.6	0.18-0.22	4.1-6.9	0.1-0.5	.43	.43			
7684:														
Wymore-----------	0-6	1-3	45-70	32-43	1.30-1.50	0.06-0.6	0.12-0.23	5.9-8.7	1.5-3.5	.37	.37	5	7	38
	6-34	1-3	40-70	40-55	1.30-1.50	0.06-0.2	0.11-0.13	8.4-11.4	0.5-2.0	.32	.32			
	34-42	1-3	40-70	35-45	1.30-1.50	0.06-0.2	0.11-0.20	6.7-9.2	0.5-1.5	.32	.32			
	42-53	1-3	40-70	32-40	1.30-1.50	0.2-0.6	0.12-0.20	5.9-7.9	0.2-1.0	.43	.43			
	53-79	1-5	40-70	25-36	1.30-1.50	0.2-0.6	0.18-0.22	4.1-6.9	0.1-0.5	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
7688:														
Wymore-----------	0-6	1-3	45-70	32-43	1.25-1.45	0.06-0.6	0.12-0.23	5.9-8.7	1.5-3.5	.37	.37	5	7	38
	6-34	1-3	40-70	40-55	1.20-1.50	0.06-0.2	0.11-0.13	8.4-11.4	0.5-2.0	.32	.32			
	34-42	1-3	40-70	35-45	1.20-1.50	0.06-0.2	0.11-0.20	6.7-9.2	0.5-1.5	.32	.32			
	42-53	1-3	40-70	32-40	1.25-1.45	0.2-0.6	0.12-0.20	5.9-7.9	0.2-1.0	.43	.43			
	53-79	1-5	40-70	25-36	1.25-1.45	0.2-0.6	0.18-0.22	4.1-6.9	0.1-0.5	.43	.43			
Baileyville------	0-6	1-2	45-70	32-45	1.25-1.45	0.06-0.2	0.12-0.23	5.4-9.2	1.0-3.5	.37	.37	5	7	38
	6-19	1-2	45-70	40-55	1.20-1.50	0.06-0.2	0.11-0.13	8.4-11.6	1.0-2.0	.28	.28			
	19-32	1-2	45-60	35-45	1.20-1.50	0.06-0.2	0.11-0.20	6.7-9.2	0.5-1.5	.32	.32			
	32-36	5-18	45-60	27-35	1.30-1.60	0.2-0.6	0.18-0.20	4.6-6.7	0.5-1.5	.43	.43			
	36-43	5-18	45-60	30-45	1.30-1.60	0.2-0.6	0.10-0.20	5.4-9.2	0.1-0.8	.43	.43			
	43-48	10-35	25-50	30-45	1.40-1.60	0.06-0.2	0.08-0.16	4.7-9.2	0.1-0.5	.32	.32			
	48-76	10-35	25-45	35-60	1.40-1.60	0.06-0.2	0.08-0.16	5.8-11.6	0.1-0.5	.32	.32			
7851:														
Judson-----------	0-7	2-8	65-80	24-27	1.30-1.35	0.6-2	0.21-0.23	3.5-4.1	4.0-5.0	.28	.28	5	6	48
	7-25	2-8	65-80	25-30	1.30-1.35	0.6-2	0.21-0.23	3.7-4.7	3.0-4.0	.28	.28			
	25-40	2-8	60-70	27-32	1.35-1.45	0.6-2	0.21-0.23	4.1-5.1	2.0-3.0	.43	.43			
	40-50	2-8	60-70	27-35	1.35-1.45	0.6-2	0.21-0.23	4.1-5.8	1.0-2.0	.43	.43			
	50-80	2-8	65-75	25-32	1.35-1.45	0.6-2	0.21-0.23	3.7-5.1	0.1-1.0	.43	.43			
9971. Arents, earthen dam														
9983. Gravel pits and quarries														
9986. Miscellaneous water														
9999. Water														

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
4020:								
Chase----------------	0-8	21-36	---	5.6-7.3	0	0	0	0
	8-17	21-33	---	5.6-7.3	0	0	0	0
	17-37	23-46	---	6.1-7.8	0	0	0	0
	37-42	18-32	---	6.1-8.4	0	0	0	0
	42-60	13-27	---	6.1-8.4	0	0	0	0
4525:								
Benfield-------------	0-6	20-29	---	6.1-7.8	0	0	0	0
	6-19	25-35	---	6.6-8.4	0	0	0	0
	19-37	23-33	---	7.4-8.4	0	0	0	0
	37-41	---	---	---	---	---	---	---
4590:								
Clime----------------	0-9	25-35	---	6.6-8.4	5-10	0	0	0
	9-22	25-41	---	7.4-8.4	5-10	0	0	0
	22-35	26-38	---	7.4-8.4	10-15	0	0	0
	35-39	---	---	---	---	---	---	---
Sogn-----------------	0-12	22-29	---	6.1-8.4	0	0	0	0
	12-16	---	---	---	---	---	---	---
4710:								
Kipson---------------	0-9	20-28	---	7.4-8.4	10-20	0	0	0
	9-19	14-25	---	7.9-9.0	30-60	0	0	0
	19-23	---	---	---	---	---	---	---
4725:								
Kipson---------------	0-8	20-29	---	6.6-8.4	10-20	0	0	0
	8-19	15-27	---	7.9-9.0	30-60	0	0	0
	19-22	---	---	---	---	---	---	---
Sogn-----------------	0-12	22-29	---	6.1-8.4	0-10	0	0	0
	12-16	---	---	---	---	---	---	---
4830:								
Wamego---------------	0-6	20-25	---	5.6-6.5	0	0	0	0
	6-10	22-29	---	5.6-6.5	0	0	0	0
	10-27	27-33	---	5.6-7.3	0	0	0	0
	27-31	---	---	---	---	---	---	---
4831:								
Wamego---------------	0-6	20-25	---	5.6-6.5	0	0	0	0
	6-10	22-29	---	5.6-6.5	0	0	0	0
	10-27	27-33	---	5.6-7.3	0	0	0	0
	27-31	---	---	---	---	---	---	---
7010:								
Calco----------------	0-17	19-29	---	7.4-8.4	5-30	0	0	0
	17-60	15-24	---	7.4-8.4	5-30	0	0	0
7050:								
Kennebec-------------	0-10	19-23	---	5.6-7.3	0	0	0	0
	10-36	19-23	---	6.1-7.3	0	0	0	0
	36-48	18-25	---	6.1-7.3	0	0	0	0
	48-60	17-24	---	6.1-7.3	0	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
7051:								
Kennebec	0-8	19-27	---	5.6-7.3	0	0	0	0
	8-30	19-26	---	5.6-7.3	0	0	0	0
	30-41	16-23	---	6.1-7.3	0	0	0	0
	41-60	15-20	---	6.1-7.3	0	0	0	0
7090:								
Wabash	0-6	27-40	---	5.6-7.3	0	0	0	0
	6-16	25-40	---	5.6-7.3	0	0	0	0
	16-52	20-46	---	6.1-7.8	0	0	0	0
	52-70	16-33	---	6.1-7.8	0	0	0	0
7170:								
Reading	0-10	16-25	---	5.6-6.5	0	0	0	0
	10-15	17-25	---	5.6-6.5	0	0	0	0
	15-35	24-28	---	5.6-6.5	0	0	0	0
	35-41	23-28	---	5.6-6.5	0	0	0	0
	41-60	23-34	---	6.1-8.4	0	0	0	0
7171:								
Reading	0-9	17-24	---	5.6-7.3	0	0	0	0
	9-18	17-24	---	5.6-7.3	0	0	0	0
	18-48	21-29	---	5.6-7.8	0	0	0	0
	48-54	21-28	---	5.6-7.8	0	0	0	0
	54-80	19-27	---	6.1-8.4	0	0	0	0
7206:								
Aksarben	0-6	21-36	---	5.1-6.5	0	0	0	0
	6-12	20-33	---	5.1-6.5	0	0	0	0
	12-42	21-34	---	5.1-6.5	0	0	0	0
	42-60	15-26	---	5.6-6.5	0	0	0	0
	60-80	10-19	---	6.1-7.3	0	0	0	0
7207:								
Aksarben	0-6	21-36	---	5.1-6.5	0	0	0	0
	6-10	20-33	---	5.1-6.5	0	0	0	0
	10-40	21-34	---	5.1-6.5	0	0	0	0
	40-60	15-26	---	5.6-6.5	0	0	0	0
	60-80	10-19	---	6.1-7.3	0	0	0	0
7220:								
Burchard	0-9	17-25	---	5.6-7.3	0	0	0	0
	9-13	21-28	---	6.1-7.3	0	0	0	0
	13-19	21-30	---	6.1-7.3	0	0	0	0
	19-29	21-30	---	7.4-8.4	5-10	0	0	0
	29-37	16-24	---	7.4-8.4	5-10	0	0	0
	37-60	14-23	---	7.4-8.4	10-15	0	0	0
7224:								
Burchard	0-7	22-27	---	5.6-7.3	0	0	0	0
	7-22	24-28	---	6.1-8.4	0	0	0	0
	22-37	21-27	---	7.4-8.4	5-10	0	0	0
	37-60	20-27	---	7.4-8.4	5-10	0	0	0
Steinauer	0-6	19-26	---	7.4-8.4	1-10	0	0	0
	6-13	19-27	---	7.4-8.4	1-10	0	0	0
	13-60	18-27	---	7.9-8.4	5-15	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
7225:								
Burchard-------------	0-9	17-25	---	5.6-7.3	0	0	0	0
	9-19	21-30	---	6.1-7.3	0	0	0	0
	19-29	21-30	---	7.4-8.4	5-10	0	0	0
	29-37	16-24	---	7.4-8.4	5-10	0	0	0
	37-60	14-23	---	7.4-8.4	10-15	0	0	0
Steinauer------------	0-6	20-28	---	7.4-8.4	1-10	0	0	0
	6-14	21-27	---	7.4-8.4	5-10	0	0	0
	14-80	14-27	---	7.4-8.4	10-15	0	0	0
7233:								
Elmont---------------	0-9	16-25	---	5.1-7.3	0	0	0	0
	9-26	22-28	---	5.1-7.3	0	0	0	0
	26-37	21-28	---	5.1-7.3	0	0	0	0
	37-45	21-27	---	5.1-7.3	0	0	0	0
	45-49	---	---	---	---	---	---	---
7301:								
Martin---------------	0-6	23-40	---	5.6-6.5	0	0	0	0
	6-12	18-32	---	5.6-7.3	0	0	0	0
	12-53	20-42	---	5.6-7.3	0	0	0	0
	53-80	11-26	---	5.6-7.8	0-1	0	0	0
7424:								
Morrill, eroded------	0-6	19-26	---	5.1-7.3	0	0	0	0
	6-27	19-27	---	5.1-7.3	0	0	0	0
	27-41	18-26	---	5.1-7.3	0	0	0	0
	41-60	17-21	---	5.1-7.3	0	0	0	0
7433:								
Morrill--------------	0-10	13-25	---	5.1-7.3	0	0	0	0
	10-29	19-27	---	5.1-7.3	0	0	0	0
	29-41	18-26	---	5.1-7.3	0	0	0	0
	41-60	17-21	---	5.1-7.3	0	0	0	0
7435:								
Morrill--------------	0-12	8.0-30	---	5.2-6.5	0	0	0	0
	12-40	10-30	---	5.6-6.5	0	0	0	0
	40-60	5.0-25	---	6.4-7.5	0	0	0	0
7436:								
Morrill, eroded------	0-6	13-23	---	5.1-7.3	0	0	0	0
	6-12	18-26	---	5.1-7.3	0	0	0	0
	12-22	18-27	---	5.1-7.3	0	0	0	0
	22-43	18-27	---	5.1-7.3	0	0	0	0
	43-80	2.7-24	---	5.1-7.3	0	0	0	0
7455:								
Olmitz---------------	0-6	19-25	---	5.6-7.3	0	0	0	0
	6-25	19-25	---	5.6-7.3	0	0	0	0
	25-44	20-25	---	5.6-7.3	0	0	0	0
	44-60	19-25	---	5.6-7.3	0	0	0	0
7470:								
Padonia--------------	0-11	22-29	---	6.1-7.3	0	0	0	0
	11-22	27-39	---	6.6-7.8	0	0	0	0
	22-32	27-38	---	7.4-8.4	1-10	0	0	0
	32-37	23-31	---	7.4-8.4	5-15	0	0	0
	37-40	---	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
7470:								
Martin---------------	0-6	23-40	---	5.6-6.5	0	0	0	0
	6-12	18-32	---	5.6-7.3	0	0	0	0
	12-53	20-42	---	5.6-7.3	0	0	0	0
	53-80	11-26	---	5.6-7.8	0-1	0	0	0
7500:								
Pawnee---------------	0-8	25-39	---	5.6-7.3	0	0	0	0
	8-15	20-38	---	5.6-7.3	0	0	0	0
	15-41	20-39	---	6.1-8.4	0	0	0	0
	41-51	18-32	---	6.1-8.4	0	0	0	0
	51-60	8.0-19	---	7.4-8.4	0-5	0	0	0
7502:								
Pawnee---------------	0-7	25-39	---	5.6-7.3	0	0	0	0
	7-12	20-38	---	5.6-7.3	0	0	0	0
	12-41	20-39	---	6.1-8.4	0	0	0	0
	41-51	18-32	---	6.1-8.4	0	0	0	0
	51-60	8.0-20	---	7.4-8.4	0-5	0	0	0
7510:								
Pawnee, eroded-------	0-6	26-38	---	5.6-7.3	0	0	0	0
	6-39	20-39	---	6.1-8.4	0	0	0	0
	39-51	18-32	---	6.1-8.4	0	0	0	0
	51-60	8.0-20	---	7.4-8.4	0-5	0	0	0
7603:								
Sibleyville----------	0-9	13-23	---	5.6-7.3	0	0	0	0
	9-14	17-26	---	5.1-7.3	0	0	0	0
	14-23	16-28	---	5.1-7.3	0	0	0	0
	23-37	12-23	---	5.1-7.3	0	0	0	0
	37-41	---	---	---	---	---	---	---
7608:								
Steinauer------------	0-6	19-26	---	7.4-8.4	1-10	0	0	0
	6-13	18-28	---	7.4-8.4	1-10	0	0	0
	13-60	18-27	---	7.9-8.4	5-15	0	0	0
7656:								
Vinland variant------	0-8	12-17	---	5.6-7.8	0	0	0	0
	8-24	11-16	---	5.6-7.8	0	0	0	0
	24-29	8.5-12	---	5.6-7.8	0	0	0	0
	29-33	---	---	---	---	---	---	---
7681:								
Wymore---------------	0-8	22-39	---	5.6-6.5	0	0	0	0
	8-11	21-37	---	5.6-6.5	0	0	0	0
	11-37	26-42	---	5.6-6.8	0	0	0	0
	37-45	18-32	---	5.6-7.3	0-3	0	0	0
	45-51	13-26	---	6.6-7.3	0-3	0	0	0
	51-79	8.0-19	---	6.6-7.3	0-3	0	0	0
7684:								
Wymore---------------	0-6	24-41	---	5.6-6.5	0	0	0	0
	6-34	21-42	---	5.6-6.5	0	0	0	0
	34-42	18-32	---	5.6-6.5	0-3	0	0	0
	42-53	13-26	---	6.6-7.3	0-3	0	0	0
	53-79	8.0-19	---	6.6-7.3	0-3	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
7688:								
Wymore---------------	0-6	24-41	---	5.6-6.5	0	0	0	0
	6-34	21-42	---	5.6-6.5	0	0	0	0
	34-42	18-32	---	5.6-6.5	0-3	0	0	0
	42-53	13-26	---	6.6-7.3	0-3	0	0	0
	53-79	8.0-19	---	6.6-7.3	0-3	0	0	0
Baileyville----------	0-6	21-43	---	5.6-7.3	0	0	0	0
	6-19	26-42	---	5.6-6.5	0	0	0	0
	19-32	18-32	---	6.1-7.3	0-3	0	0	0
	32-36	15-26	---	6.1-7.3	0	0	0	0
	36-43	9.4-26	---	6.1-7.3	0	0	0	0
	43-48	9.4-23	---	6.1-7.8	0-7	0	0	0
	48-76	11-29	---	6.6-7.8	0-7	0	0	0
7851:								
Judson---------------	0-7	21-23	---	5.6-7.3	0	0	0	0
	7-25	21-25	---	5.6-7.3	0	0	0	0
	25-40	22-26	---	5.6-7.3	0	0	0	0
	40-50	22-28	---	5.6-7.3	0	0	0	0
	50-80	19-25	---	6.1-7.8	0	0	0	0
9971.								
Arents, earthen dam								
9983.								
Gravel pits and quarries								
9986.								
Miscellaneous water								
9999.								
Water								

Table 19.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In				
4020:						
Chase	---	---	---	High	High	Low
4525:						
Benfield	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
4590:						
Clime	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Sogn	Bedrock (lithic)	4-20	Indurated	Moderate	Low	Low
4710:						
Kipson	Bedrock (paralithic)	7-20	Weakly cemented	Moderate	Low	Low
4725:						
Kipson	Bedrock (paralithic)	7-20	Noncemented	Moderate	Low	Low
Sogn	Bedrock (lithic)	4-20	Indurated	Moderate	Low	Low
4830:						
Wamego	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	Moderate	Moderate
4831:						
Wamego	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	Moderate	Moderate
7010:						
Calco	---	---	---	High	High	Low
7050:						
Kennebec	---	---	---	High	Moderate	Low
7051:						
Kennebec	---	---	---	High	Moderate	Low
7090:						
Wabash	---	---	---	Moderate	High	Moderate
7170:						
Reading	---	---	---	High	Moderate	Low
7171:						
Reading	---	---	---	High	Moderate	Low
7206:						
Aksarben	---	---	---	High	Moderate	Moderate
7207:						
Aksarben	---	---	---	High	Moderate	Moderate
7220:						
Burchard	---	---	---	Moderate	Moderate	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
7224:						
Burchard	---	---	---	Moderate	Moderate	Low
Steinauer	---	---	---	Moderate	High	Low
7225:						
Burchard	---	---	---	Moderate	Moderate	Low
Steinauer	---	---	---	Moderate	Moderate	Low
7233:						
Elmont	Bedrock (paralithic)	40-60	Weakly cemented	High	Moderate	Low
7301:						
Martin	---	---	---	High	High	Low
7424:						
Morrill, eroded	---	---	---	Moderate	Moderate	Moderate
7433:						
Morrill	---	---	---	Moderate	Moderate	Moderate
7435:						
Morrill	---	---	---	Moderate	Moderate	Moderate
7436:						
Morrill, eroded	---	---	---	Moderate	Moderate	Moderate
7455:						
Olmitz	---	---	---	Moderate	Moderate	Moderate
7470:						
Padonia	Bedrock (paralithic)	20-40	Noncemented	Moderate	High	Low
Martin	---	---	---	High	High	Low
7500:						
Pawnee	---	---	---	High	High	Low
7502:						
Pawnee	---	---	---	High	High	Low
7510:						
Pawnee, eroded	---	---	---	High	High	Low
7603:						
Sibleyville	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	Low	Moderate
7608:						
Steinauer	---	---	---	Moderate	High	Low
7656:						
Vinland variant	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	Moderate	Low
7681:						
Wymore	---	---	---	High	High	Moderate
7684:						
Wymore	---	---	---	High	High	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In				
7688:						
Wymore-----------------	---	---	---	High	High	Moderate
Baileyville------------	---	---	---	High	High	Moderate
7851:						
Judson-----------------	---	---	---	High	Moderate	Low
9971.						
Arents, earthen dam						
9983.						
Gravel pits and quarries						
9986.						
Miscellaneous water						
9999.						
Water						

Table 20.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
4020:						
Chase	C					
		January	---	---	Very brief	Occasional
		February	2.0-4.0	>6.0	Very brief	Occasional
		March	2.0-4.0	>6.0	Very brief	Occasional
		April	2.0-4.0	>6.0	Very brief	Occasional
		May	2.0-4.0	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	---	---	Very brief	Occasional
4525:						
Benfield	C					
		Jan-Dec	---	---	---	None
4590:						
Clime	C					
		Jan-Dec	---	---	---	None
Sogn	D					
		Jan-Dec	---	---	---	None
4710:						
Kipson	D					
		Jan-Dec	---	---	---	None
4725:						
Kipson	D					
		Jan-Dec	---	---	---	None
Sogn	D					
		Jan-Dec	---	---	---	None
4830:						
Wamego	C					
		Jan-Dec	---	---	---	None
4831:						
Wamego	C					
		Jan-Dec	---	---	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
7010:						
Calco	D					
		January	0.0-3.0	>6.0	Brief	Frequent
		February	0.0-3.0	>6.0	Brief	Frequent
		March	0.0-3.0	>6.0	Brief	Frequent
		April	0.0-3.0	>6.0	Brief	Frequent
		May	0.0-3.0	>6.0	Brief	Frequent
		June	0.0-3.0	>6.0	Brief	Frequent
		July	0.0-3.0	>6.0	Brief	Frequent
		August	---	---	Brief	Frequent
		September	---	---	Brief	Frequent
		October	---	---	Brief	Frequent
		November	0.0-3.0	>6.0	Brief	Frequent
		December	0.0-3.0	>6.0	Brief	Frequent
7050:						
Kennebec	B					
		January	---	---	Very brief	Occasional
		February	3.3-3.7	>6.0	Very brief	Occasional
		March	3.3-3.7	>6.0	Very brief	Occasional
		April	3.3-3.7	>6.0	Very brief	Occasional
		May	---	---	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	---	---	Very brief	Occasional
7051:						
Kennebec	B					
		January	3.0-5.0	>6.0	Brief	Frequent
		February	3.0-5.0	>6.0	Brief	Frequent
		March	3.0-5.0	>6.0	Brief	Frequent
		April	3.0-5.0	>6.0	Brief	Frequent
		May	3.0-5.0	>6.0	Brief	Frequent
		June	3.0-5.0	>6.0	Brief	Frequent
		July	3.0-5.0	>6.0	Brief	Frequent
		August	---	---	Brief	Frequent
		September	---	---	Brief	Frequent
		October	---	---	Brief	Frequent
		November	3.0-5.0	>6.0	Brief	Frequent
		December	3.0-5.0	>6.0	Brief	Frequent
7090:						
Wabash	D					
		January	0.2-0.8	>6.0	Very brief	Occasional
		February	0.2-0.8	>6.0	Very brief	Occasional
		March	0.2-0.8	>6.0	Very brief	Occasional
		April	0.2-0.8	>6.0	Very brief	Occasional
		May	0.2-0.8	>6.0	Very brief	Occasional
		June	0.8-1.2	>6.0	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	0.8-1.2	>6.0	Very brief	Occasional
		December	0.8-1.2	>6.0	Very brief	Occasional

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
7170:						
Reading------------------	B					
		January	---	---	---	Rare
		February	---	---	---	Rare
		March	---	---	---	Rare
		April	---	---	---	Rare
		May	---	---	---	Rare
		June	---	---	---	Rare
		July	---	---	---	Rare
		August	---	---	---	Rare
		September	---	---	---	Rare
		October	---	---	---	Rare
		November	---	---	---	Rare
		December	---	---	---	Rare
7171:						
Reading------------------	B					
		January	---	---	---	Rare
		February	---	---	---	Rare
		March	---	---	---	Rare
		April	---	---	---	Rare
		May	---	---	---	Rare
		June	---	---	---	Rare
		July	---	---	---	Rare
		August	---	---	---	Rare
		September	---	---	---	Rare
		October	---	---	---	Rare
		November	---	---	---	Rare
		December	---	---	---	Rare
7206:						
Aksarben-----------------	B					
		Jan-Dec	---	---	---	None
7207:						
Aksarben-----------------	B					
		Jan-Dec	---	---	---	None
7220:						
Burchard-----------------	B					
		Jan-Dec	---	---	---	None
7224:						
Burchard-----------------	B					
		Jan-Dec	---	---	---	None
Steinauer----------------	B					
		Jan-Dec	---	---	---	None
7225:						
Burchard-----------------	B					
		Jan-Dec	---	---	---	None
Steinauer----------------	B					
		Jan-Dec	---	---	---	None
7233:						
Elmont-------------------	B					
		Jan-Dec	---	---	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
7301:						
Martin	C					
		February	1.8-2.2	2.8-3.2	---	None
		March	1.8-2.2	2.8-3.2	---	None
		April	1.8-2.2	2.8-3.2	---	None
7424:						
Morrill, eroded	B					
		Jan-Dec	---	---	---	None
7433:						
Morrill	B					
		Jan-Dec	---	---	---	None
7435:						
Morrill	B					
		Jan-Dec	---	---	---	None
7436:						
Morrill, eroded	B					
		Jan-Dec	---	---	---	None
7455:						
Olmitz	B					
		Jan-Dec	---	---	---	None
7470:						
Padonia	C					
		Jan-Dec	---	---	---	None
Martin	C					
		February	1.8-2.2	2.8-3.2	---	None
		March	1.8-2.2	2.8-3.2	---	None
		April	1.8-2.2	2.8-3.2	---	None
7500:						
Pawnee	D					
		March	1.0-1.5	2.0-3.0	---	None
		April	1.0-1.5	2.0-3.0	---	None
		May	1.0-1.5	2.0-3.0	---	None
7502:						
Pawnee	D					
		March	1.0-1.5	2.0-3.0	---	None
		April	1.0-1.5	2.0-3.0	---	None
		May	1.0-1.5	2.0-3.0	---	None
7510:						
Pawnee, eroded	D					
		March	1.0-1.5	2.0-3.0	---	None
		April	1.0-1.5	2.0-3.0	---	None
		May	1.0-1.5	2.0-3.0	---	None
7603:						
Sibleyville	B					
		Jan-Dec	---	---	---	None
7608:						
Steinauer	B					
		Jan-Dec	---	---	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
7656:						
Vinland variant-----------	B					
		Jan-Dec	---	---	---	None
7681:						
Wymore--------------------	D					
		March	1.0-3.0	1.5-3.0	---	None
		April	1.0-3.0	1.5-3.0	---	None
7684:						
Wymore--------------------	D					
		March	1.0-3.0	1.0-3.0	---	None
		April	1.0-3.0	1.0-3.0	---	None
7688:						
Wymore--------------------	D					
		March	1.0-3.0	1.5-3.0	---	None
		April	1.0-3.0	1.5-3.0	---	None
Baileyville---------------	D					
		March	1.0-3.0	1.5-3.0	---	None
		April	1.0-3.0	1.5-3.0	---	None
7851:						
Judson--------------------	B					
		Jan-Dec	---	---	---	None
9971.						
Arents, earthen dam						
9983.						
Gravel pits and quarries						
9986.						
Miscellaneous water						
9999.						
Water						

Table 21.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Aksarben	Fine, smectitic, mesic Typic Argiudolls
Baileyville	Fine, smectitic, mesic Oxyaquic Vertic Argiudolls
Benfield	Fine, mixed, mesic Udic Argiustolls
Burchard	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
*Calco	Fine-silty, mixed, calcareous, mesic Cumulic Haplaquolls
Chase	Fine, smectitic, mesic Aquertic Argiudolls
Clime	Fine, mixed, mesic Udorthentic Haplustolls
Elmont	Fine-silty, mixed, superactive, mesic Typic Argiudolls
Judson	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kennebec	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kipson	Loamy, mixed, superactive, mesic, shallow Udorthentic Haplustolls
Leanna	Fine, mixed, superactive, thermic Typic Argialbolls
Marshall	Fine-silty, mixed, superactive, mesic Typic Hapludolls
Martin	Fine, smectitic, mesic Aquertic Argiudolls
Morrill	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Olmitz	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Otoe	Fine, smectitic, mesic Aquertic Hapludalfs
Padonia	Fine, mixed, superactive, mesic Typic Argiudolls
Pawnee	Fine, smectitic, mesic Oxyaquic Vertic Argiudolls
Reading	Fine-silty, mixed, superactive, mesic Pachic Argiudolls
Sibleyville	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Sogn	Loamy, mixed, superactive, mesic Lithic Haplustolls
Steinauer	Fine-loamy, mixed, superactive, calcareous, mesic Typic Udorthents
Vinland	Coarse-silty, mixed, mesic Typic Hapludolls
Wabash	Fine, smectitic, mesic Cumulic Vertic Endoaquolls
Wamego	Fine, mixed, superactive, mesic Typic Argiudolls
Wymore	Fine, smectitic, mesic Aquertic Argiudolls
Zook	Fine, smectitic, mesic Cumulic Vertic Endoaquolls

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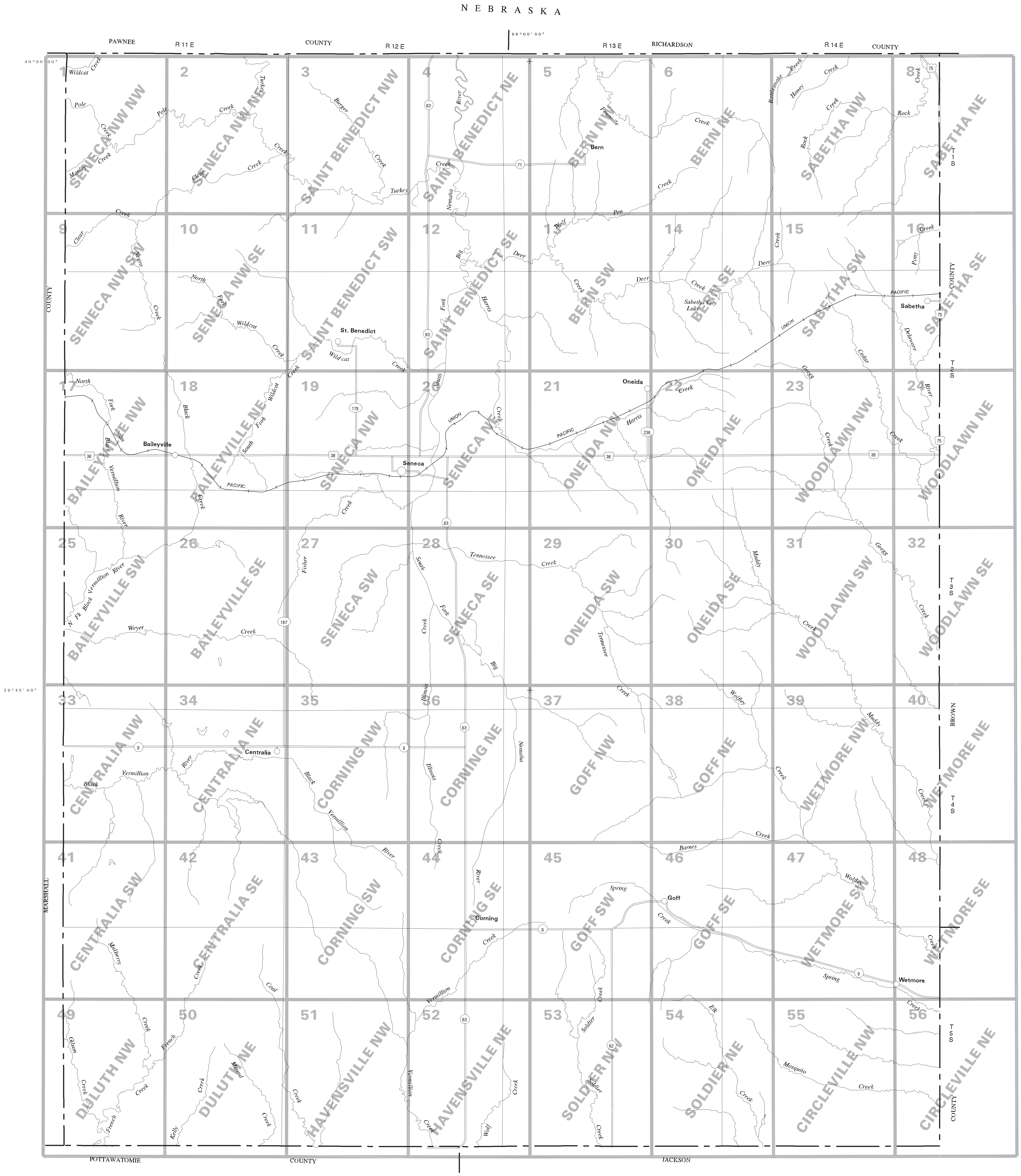


SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

INDEX TO MAP SHEETS
NEMAHA COUNTY, KANSAS

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

SCALE = 1:100000

SOIL LEGEND

SYMBOL	NAME
4020	Chase silty clay loam, occasionally flooded
4525	Benfield silty clay loam, 3 to 7 percent slopes
4590	Clime-Sogn complex, 3 to 20 percent slopes
4710	Kipson silty clay loam, 5 to 30 percent slopes
4725	Kipson-Sogn complex, 5 to 30 percent slopes
4830	Wamego silt loam, 3 to 7 percent slopes
4831	Wamego silt loam, 7 to 20 percent slopes
7010	Calco silty clay loam, frequently flooded
7050	Kennebec silt loam, occasionally flooded
7051	Kennebec silt loam, frequently flooded
7090	Wabash silty clay loam, occasionally flooded
7170	Reading silt loam, rarely flooded
7171	Reading silt loam, moderately wet, rarely flooded
7206	Aksarben silty clay loam, 2 to 5 percent slopes
7207	Aksarben silty clay loam, 5 to 11 percent slopes
7220	Burchard clay loam, 6 to 12 percent slopes
7224	Burchard-Steinauer clay loams, 6 to 12 percent slopes
7225	Burchard-Steinauer clay loams, 12 to 18 percent slopes
7233	Elmont silt loam, 3 to 7 percent slopes
7301	Martin silty clay loam, 1 to 3 percent slopes
7424	Morrill clay loam, 3 to 7 percent slopes, eroded
7433	Morrill loam, 3 to 7 percent slopes
7435	Morrill loam, 7 to 12 percent slopes
7436	Morrill loam, 7 to 12 percent slopes, eroded
7455	Olmitz loam, 1 to 5 percent slopes
7470	Padonia-Martin silty clay loams, 5 to 9 percent slopes
7500	Pawnee clay loam, 1 to 3 percent slopes
7502	Pawnee clay loam, 3 to 7 percent slopes
7510	Pawnee clay, 3 to 7 percent slopes, eroded
7603	Sibleyville loam, 3 to 7 percent slopes
7608	Steinauer clay loam, 12 to 25 percent slopes
7656	Vinland variant loam, 5 to 25 percent slopes
7681	Wymore silty clay loam, 1 to 3 percent slopes
7684	Wymore silty clay loam, 3 to 6 percent slopes, eroded
7688	Wymore-Baileyville complex, 3 to 6 percent slopes, eroded
7851	Judson silt loam, 1 to 5 percent slopes
9971	Arents, earthen dam
9983	Gravel pits and quarries
9986	Miscellaneous water
9999	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)
- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER (section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION
- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate — 173, 79 345
- Federal — 287, 410 224
- State — 52, 52 347
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS
- Medium or Small

LANDFORM FEATURES
- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label) — Mt Carmel
- Located object (label) — Ranger Station
- Tank (label) — Petroleum
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS
- Perennial, double line
- Perennial, single line — Label only
- Intermittent — Label only
- Drainage end — Label only

DRAINAGE AND IRRIGATION
- Double-line canal (label) — CANAL
- Perennial drainage and/or irrigation ditch — Label only
- Intermittent drainage and/ or irrigation ditch — Label only

SMALL LAKES, PONDS AND RESERVOIRS
- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES
- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — 4525 7206

LANDFORM FEATURES
- ESCARPMENTS
  - Bedrock
  - Other than bedrock
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION, closed
- SINKHOLE

EXCAVATIONS
- PITS
  - Borrow pits
  - Gravel pit
  - Mine or quarry
- LANDFILL

MISCELLANEOUS SURFACE FEATURES
- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

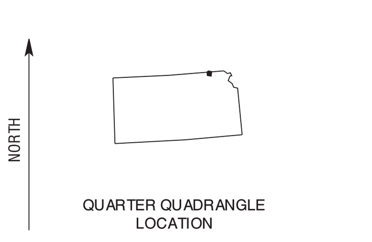
NEMAHA COUNTY, KANSAS
SENECA NW NW QUADRANGLE (OVERSIZED)
SHEET NUMBER 1 OF 56

Joins sheet 9, Seneca NW SW

Joins sheet 10, Seneca NW SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

SENECA NW NW, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 1 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA NW NE QUADRANGLE (OVERSIZED)
SHEET NUMBER 2 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

SENECA NW NE, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 2 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SAINT BENEDICT NW QUADRANGLE (OVERSIZED)
SHEET NUMBER 3 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

SAINT BENEDICT NW, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 3 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SAINT BENEDICT NE QUADRANGLE (OVERSIZED)
SHEET NUMBER 4 OF 56

Joins sheet 3, Saint Benedict NW

Joins sheet 5, Bern NW

Joins sheet 11, Saint Benedict SW

Joins sheet 12, Saint Benedict SE

Joins sheet 13, Bern SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SAINT BENEDICT NE, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 4 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BERN NW QUADRANGLE (OVERSIZED)
SHEET NUMBER 5 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

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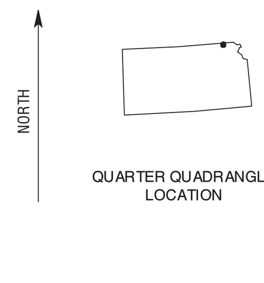
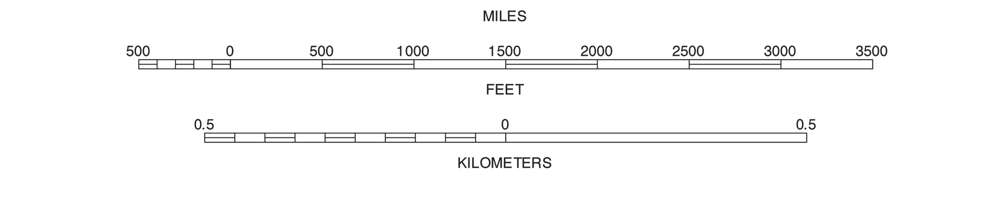


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



BERN NW, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 5 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BERN NE QUADRANGLE (OVERSIZED)
SHEET NUMBER 6 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

BERN NE, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 6 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SABETHA NW QUADRANGLE (OVERSIZED)
SHEET NUMBER 7 OF 56

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

SABETHA NW, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 7 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SABETHA NE QUADRANGLE (OVERSIZED)
SHEET NUMBER 8 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SABETHA NE, (OVERSIZED) KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 8 OF 56

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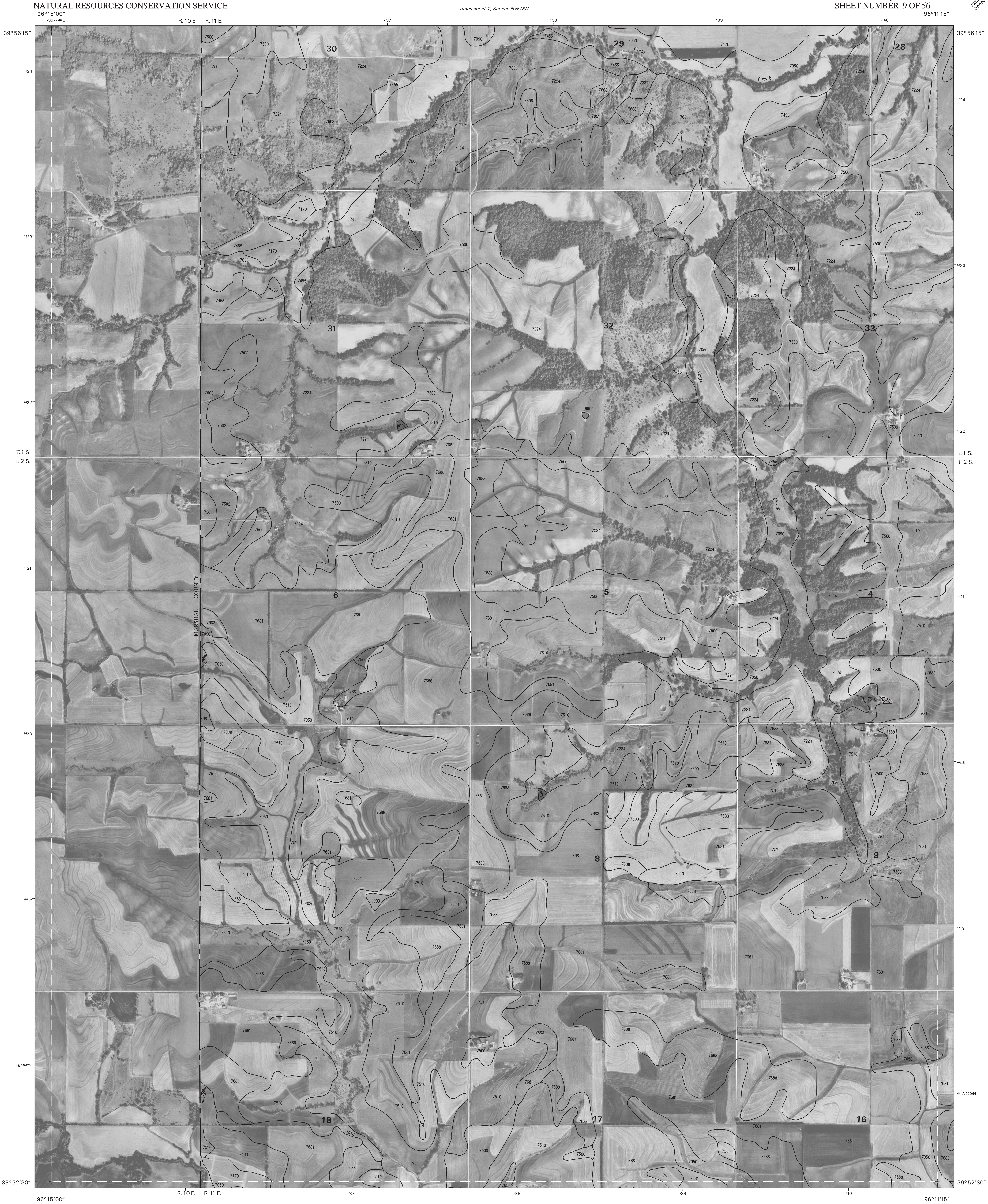
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA NW SW QUADRANGLE
SHEET NUMBER 9 OF 56



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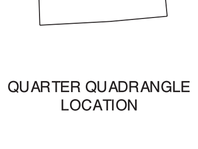

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SENECA NW SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 9 OF 56

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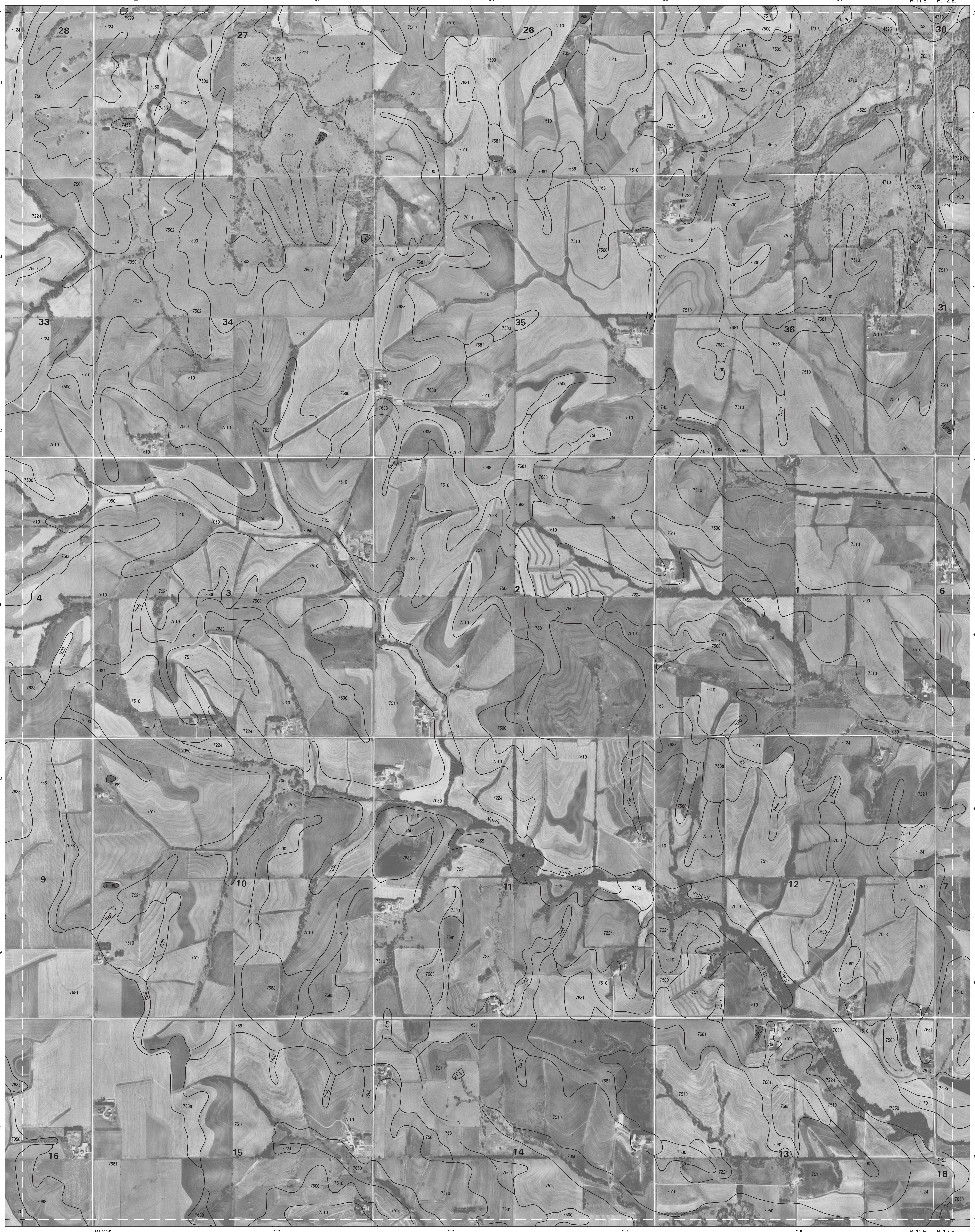
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA NW SE QUADRANGLE
SHEET NUMBER 10 OF 56



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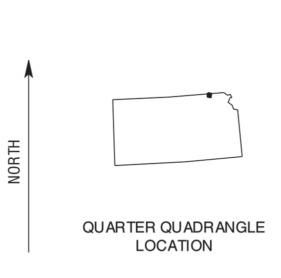
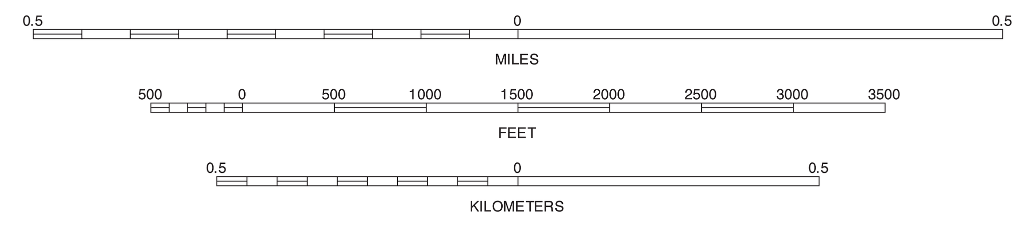


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



SENECA NW SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 10 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SAINT BENEDICT SW QUADRANGLE
SHEET NUMBER 11 OF 56

Joins sheet 2, Seneca NW NE

Joins sheet 3, Saint Benedict NW

Joins sheet 4, Saint Benedict NE

Joins sheet 10, Seneca NW SE

Joins sheet 12, Saint Benedict SE

Joins sheet 18, Baileyville NE

Joins sheet 19, Seneca NW

Joins sheet 20, Seneca NE

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North American Datum of 1983(NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SAINT BENEDICT SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 11 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 3, Saint Benedict NW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SAINT BENEDICT SE QUADRANGLE
SHEET NUMBER 12 OF 56

Joins sheet 5, Bern NW

Joins sheet 4, Saint Benedict NE

96° 03′ 45″ | 96° 00′ 00″ | 39° 56′ 15″ | 39° 52′ 30″

Joins sheet 11, Saint Benedict SW

Joins sheet 13, Bern SW

Joins sheet 19, Seneca NW

Joins sheet 20, Seneca NE

Joins sheet 21, Oneida NW

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SAINT BENEDICT SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 12 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BERN SW QUADRANGLE
SHEET NUMBER 13 OF 56

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

BERN SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 13 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BERN SE QUADRANGLE
SHEET NUMBER 14 OF 56

Joins sheet 5, Bern NW

Joins sheet 6, Bern NE

Joins sheet 7, Sabetha NW

Joins sheet 13, Bern SW

Joins sheet 15, Sabetha SW

Joins sheet 21, Oneida NW

Joins sheet 22, Oneida NE

Joins sheet 23, Woodlawn NW

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

BERN SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 14 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 6, Bern NE

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SABETHA SW QUADRANGLE
SHEET NUMBER 15 OF 56

Joins sheet 8, Sabetha NE

Joins sheet 7, Sabetha NW

95° 52′30″ 95° 48′45″

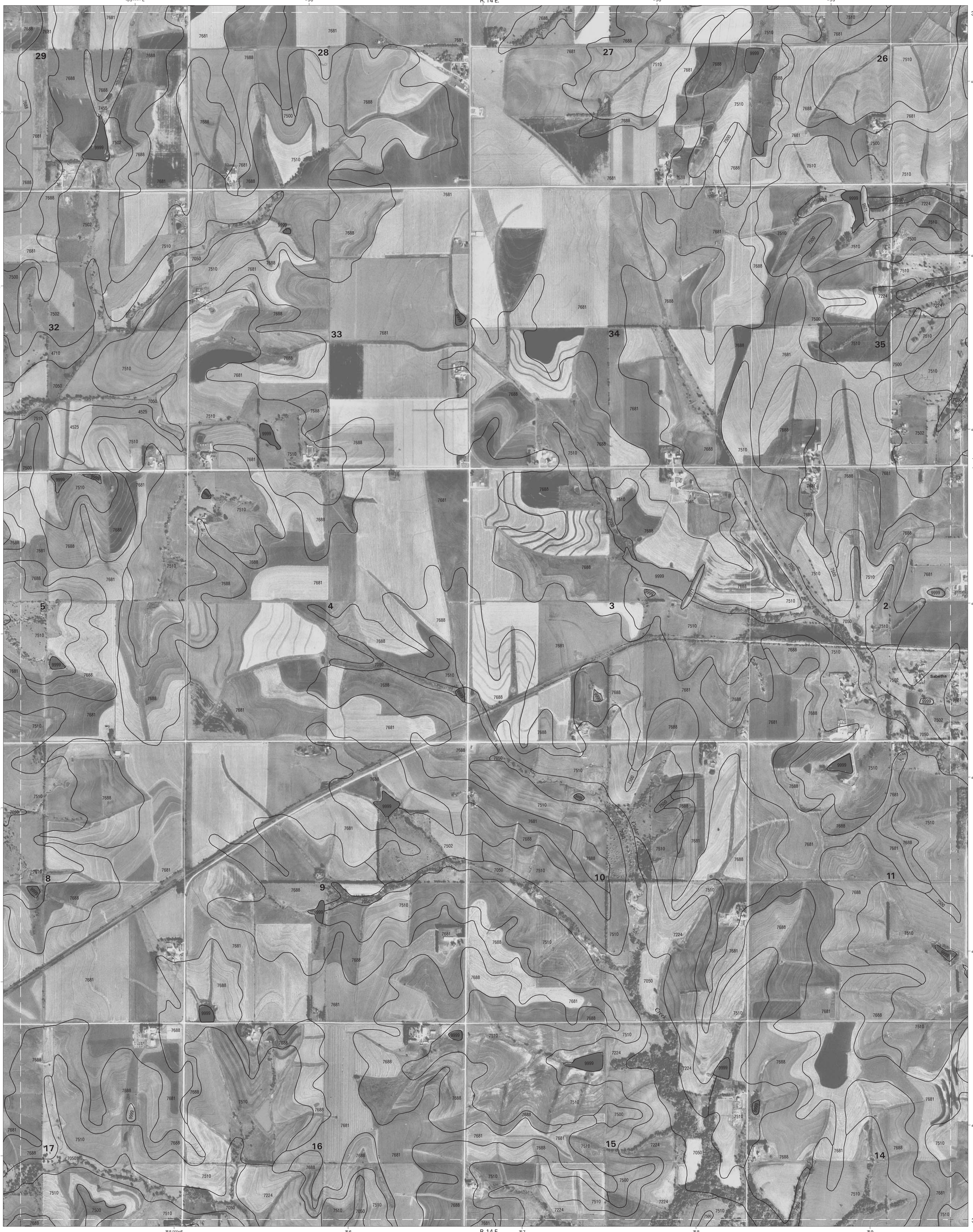
39° 56′15″ 39° 56′15″

R. 14 E.

T. 1 S.
T. 2 S.

Joins sheet 14, Bern SE

Joins sheet 16, Sabetha SE



39° 52′30″ 39° 52′30″

R. 14 E.

95° 52′30″ 95° 48′45″

Joins sheet 23, Woodlawn NW

Joins sheet 22, Oneida NE

Joins sheet 24, Woodlawn NE

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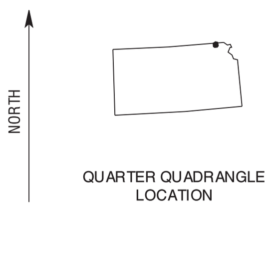
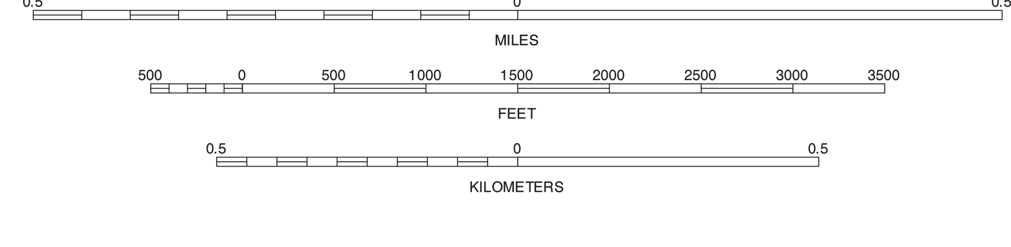


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



SABETHA SW, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 15 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SABETHA SE QUADRANGLE
SHEET NUMBER 16 OF 56

Joins sheet 7, Sabetha NW

Joins sheet 8, Sabetha NE

Joins sheet 15, Sabetha SW

Joins sheet 24, Woodlawn NE

Joins sheet 23, Woodlawn NW

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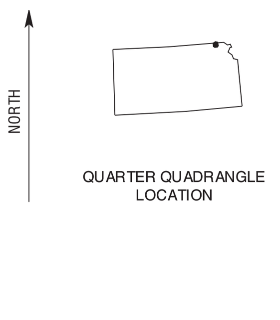
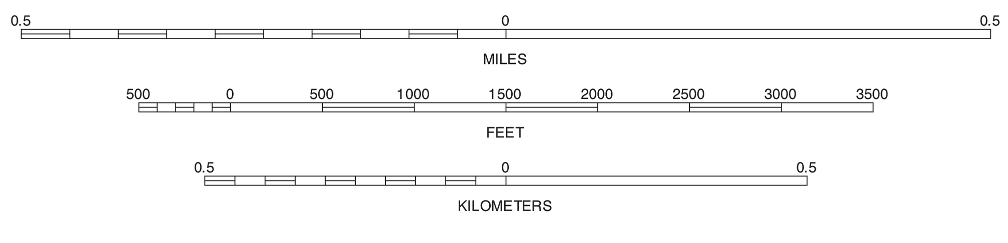


SCALE 1:12000



SABETHA SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 16 OF 56

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

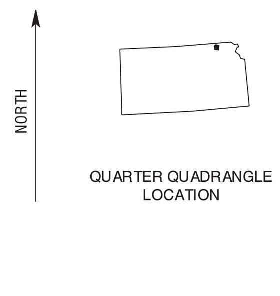
NEMAHA COUNTY, KANSAS
BAILEYVILLE NW QUADRANGLE
SHEET NUMBER 17 OF 56

SCALE 1:12000

MILES

FEET

KILOMETERS



QUARTER QUADRANGLE
LOCATION

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BAILEYVILLE NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 17 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BAILEYVILLE NE QUADRANGLE
SHEET NUMBER 18 OF 56

Joins sheet 9, Seneca NW SW

Joins sheet 10, Seneca NW SE

Joins sheet 11, Saint Benedict SW

Joins sheet 17, Baileyville NW

Joins sheet 19, Seneca NW

Joins sheet 25, Baileyville SW

Joins sheet 26, Baileyville SE

Joins sheet 27, Seneca SW

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

BAILEYVILLE NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 18 OF 56

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UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA NW QUADRANGLE
SHEET NUMBER 19 OF 56

Joins sheet 10, Seneca NW SE

Joins sheet 11, Saint Benedict SW

Joins sheet 12, Saint Benedict SE

96° 07′ 30″ — 39° 52′ 30″ — 96° 03′ 45″ — 39° 52′ 30″

Joins sheet 18, Baileyville NE

Joins sheet 20, Seneca NE

39° 48′ 45″ — 96° 07′ 30″ — 96° 03′ 45″ — 39° 48′ 45″

Joins sheet 27, Seneca SW

Joins sheet 26, Baileyville SE

Joins sheet 28, Seneca SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 14.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SENECA NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 19 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA NE QUADRANGLE
SHEET NUMBER 20 OF 56

Joins sheet 11, Saint Benedict SW

Joins sheet 12, Saint Benedict SE

Joins sheet 13, Bern SW

96° 03′ 45″

96° 00′ 00″

39° 52′ 30″

R. 12 E. R. 13 E.

Joins sheet 19, Seneca NW

Joins sheet 21, Oneida NW

39° 48′ 45″

96° 03′ 45″

96° 00′ 00″

R. 12 E. R. 13 E.

Joins sheet 27, Seneca SW

Joins sheet 28, Seneca SE

Joins sheet 29, Oneida SW

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SENECA NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 20 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
ONEIDA NW QUADRANGLE
SHEET NUMBER 21 OF 56

SCALE 1:12000

MILES

FEET

KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

ONEIDA NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 21 OF 56

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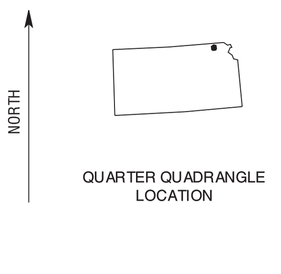
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

ONEIDA NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 22 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WOODLAWN NW QUADRANGLE
SHEET NUMBER 23 OF 56

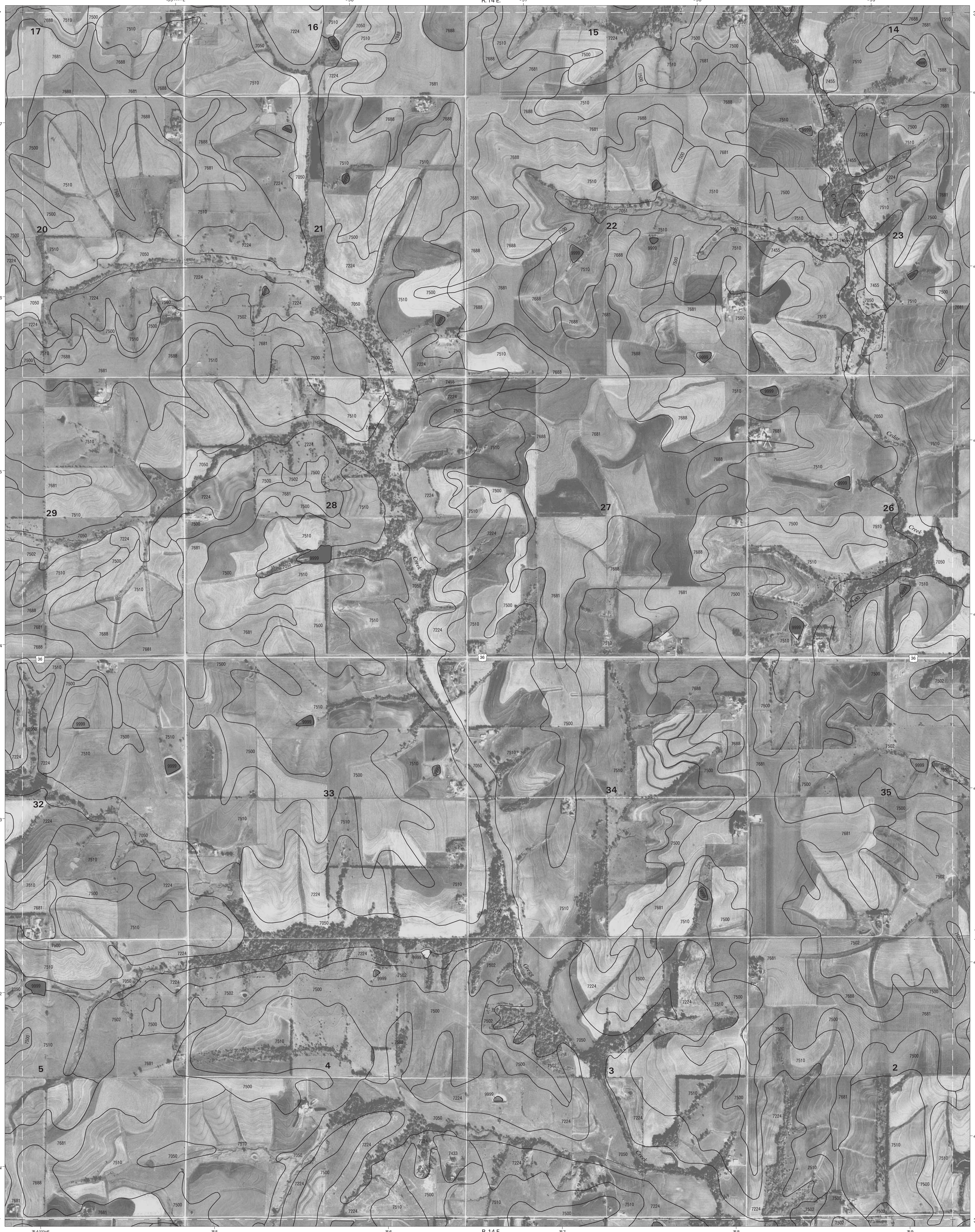
Joins sheet 14, Bern SE

Joins sheet 15, Sabetha SW

Joins sheet 16, Sabetha SE

95° 52′30″ 95° 48′45″

39° 52′30″



39° 48′45″

95° 52′30″ 95° 48′45″

Joins sheet 22, Oneida NE

Joins sheet 24, Woodlawn NE

Joins sheet 30, Oneida SE

Joins sheet 31, Woodlawn SW

Joins sheet 32, Woodlawn SE

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

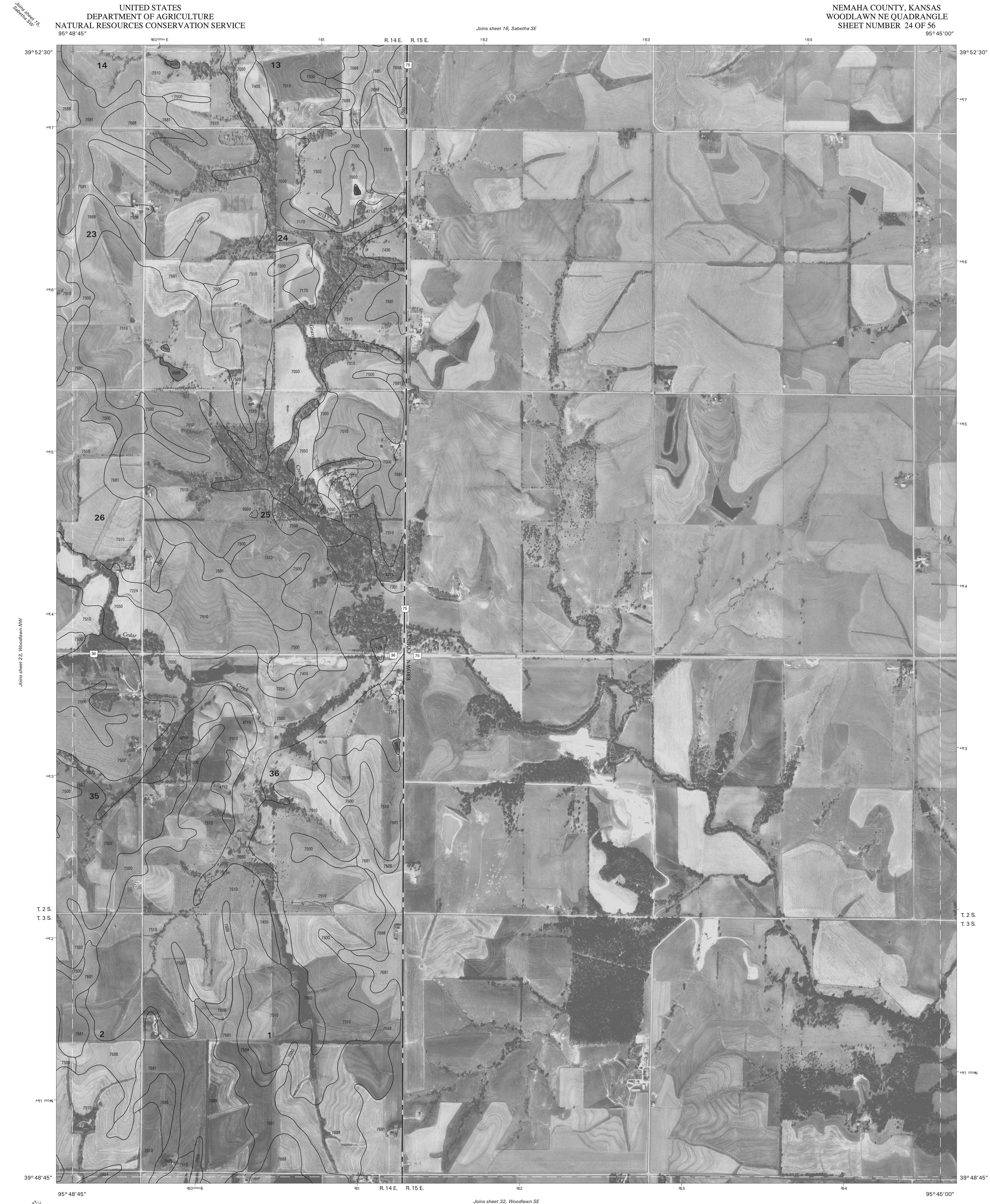
0.5 0 0.5
KILOMETERS

WOODLAWN NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 23 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

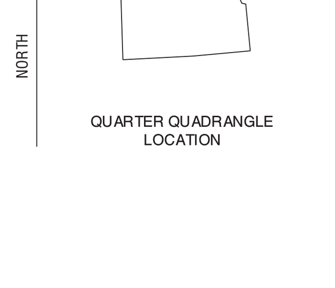
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WOODLAWN NE QUADRANGLE
SHEET NUMBER 24 OF 56

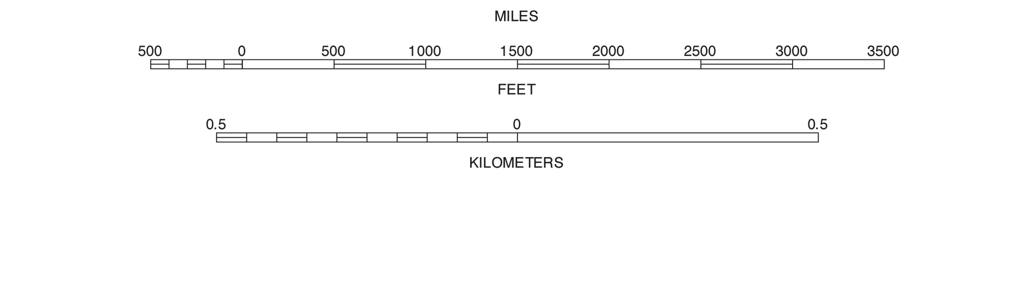


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



SCALE 1:12000



WOODLAWN NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 24 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
BAILEYVILLE SW QUADRANGLE
SHEET NUMBER 25 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

BAILEYVILLE SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

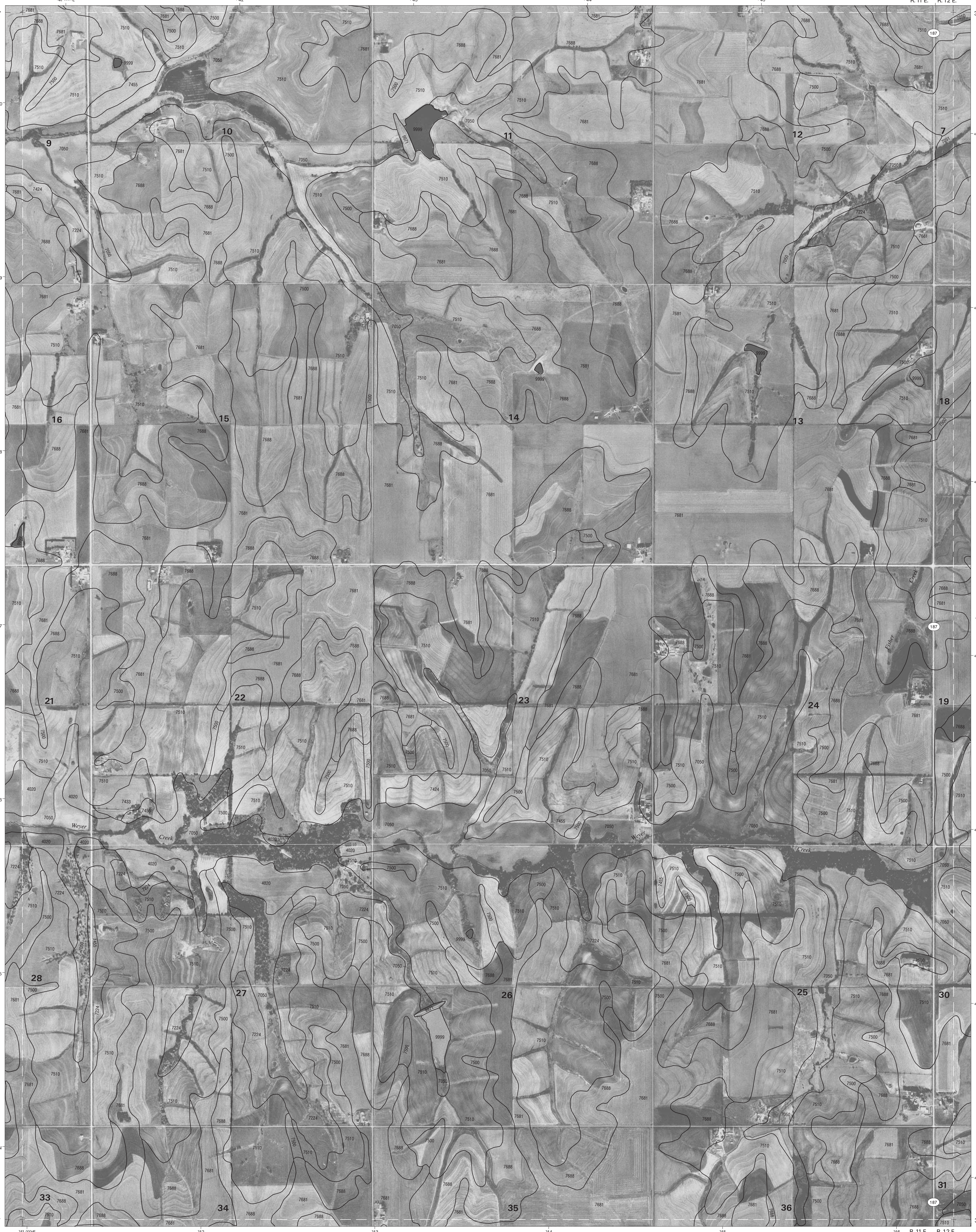
Joins sheet 17, Baileyville NW

Joins sheet 18, Baileyville NE

Joins sheet 19, Seneca NW

96°11′15″ 741 000m E 742 743 744 745 96°07′30″ R. 11 E. R. 12 E.

39°48′45″



Joins sheet 25, Baileyville SW

Joins sheet 27, Seneca SW

39°45′00″

741 000m E 742 743 744 745 746 R. 11 E. R. 12 E.
96°11′15″ 96°07′30″

Joins sheet 33, Centralia NW

Joins sheet 34, Centralia NE

Joins sheet 35, Corning NW

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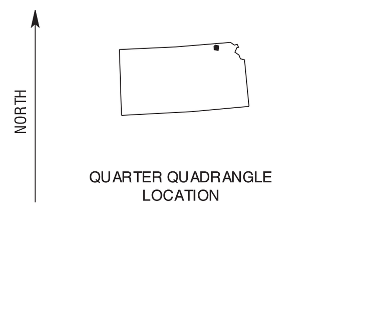
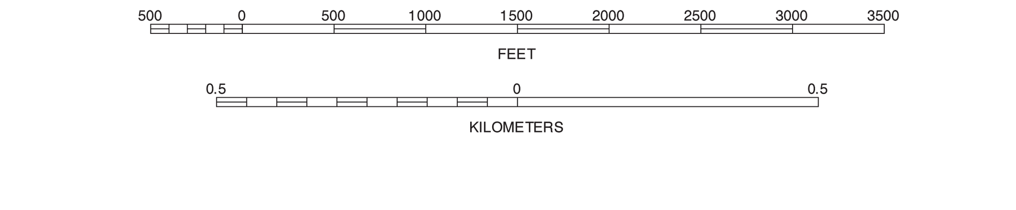
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE
LOCATION

SCALE 1:12000



BAILEYVILLE SE, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 26 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA SW QUADRANGLE
SHEET NUMBER 27 OF 56

Joins sheet 18, Baileyville NE

Joins sheet 19, Seneca NW

Joins sheet 20, Seneca NE

96° 07′30″ — 747 000m E — 748 — R. 12 E. — 749 — 750 — 751 — 96° 03′45″

39° 48′45″

Joins sheet 26, Baileyville SE

Joins sheet 28, Seneca NE

39° 45′00″

96° 07′30″ — 747 000m E — 748 — R. 12 E. — 750 — 751 — 96° 03′45″

Joins sheet 34, Centralia NE

Joins sheet 35, Corning NW

Joins sheet 36, Corning NE

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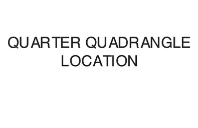
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SENECA SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 27 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SENECA SE QUADRANGLE
SHEET NUMBER 28 OF 56

Joins sheet 19, Seneca NW

Joins sheet 20, Seneca NE

Joins sheet 21, Oneida NW

Joins sheet 27, Seneca SW

Joins sheet 29, Oneida SW

Joins sheet 35, Corning NW

Joins sheet 36, Corning NE

Joins sheet 37, Goff NW

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SENECA SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 28 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
ONEIDA SW QUADRANGLE
SHEET NUMBER 29 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

ONEIDA SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 29 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
ONEIDA SE QUADRANGLE
SHEET NUMBER 30 OF 56

Joins sheet 21, Oneida NW

Joins sheet 22, Oneida NE

Joins sheet 23, Woodlawn NW

95° 56′15″ 39° 48′45″ R. 13 E. R. 14 E. 95° 52′30″ 39° 48′45″

Joins sheet 29, Oneida SW T. 3 S.

Joins sheet 31, Woodlawn SW T. 3 S.

39° 45′00″ 95° 56′15″ R. 13 E. R. 14 E. 39° 45′00″ 95° 52′30″

Joins sheet 37, Goff NW

Joins sheet 38, Goff NE

Joins sheet 39, Wetmore NW

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

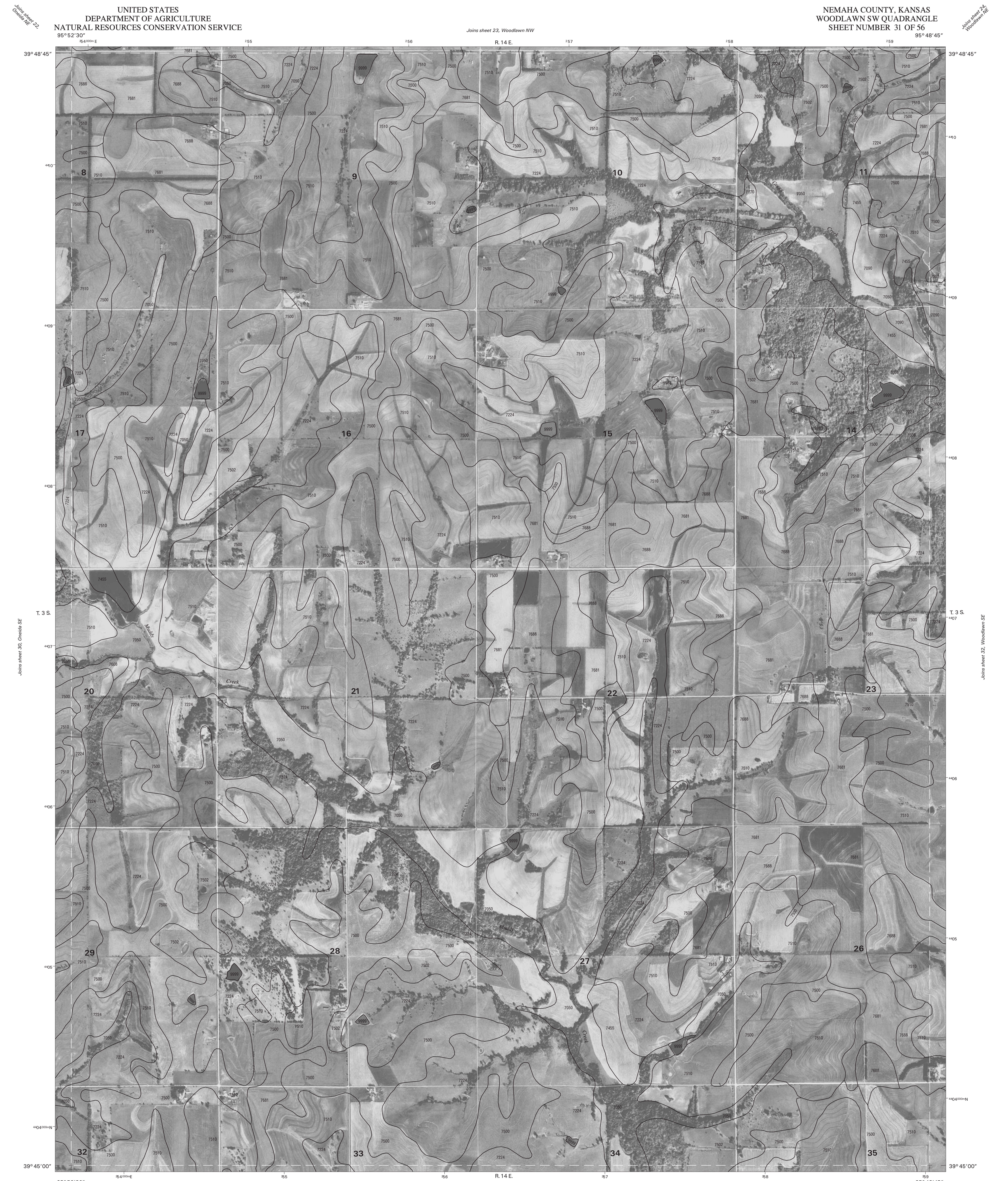
ONEIDA SE, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 30 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WOODLAWN SW QUADRANGLE
SHEET NUMBER 31 OF 56



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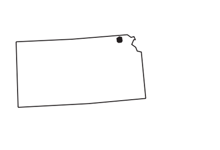
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

WOODLAWN SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 31 OF 56

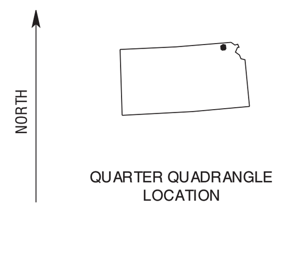
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WOODLAWN SE QUADRANGLE
SHEET NUMBER 32 OF 56

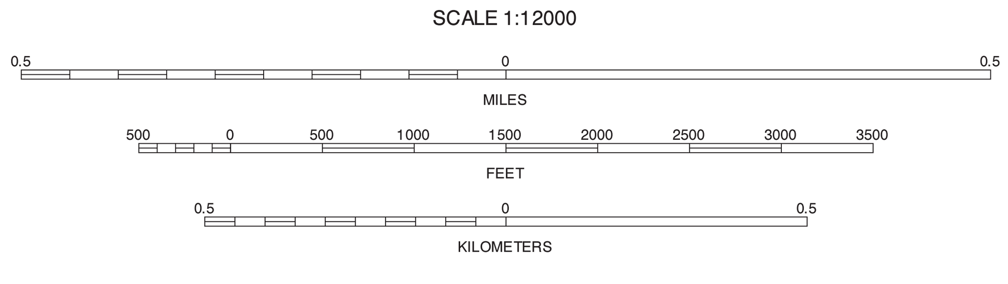
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



WOODLAWN SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 32 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CENTRALIA NW QUADRANGLE
SHEET NUMBER 33 OF 56

SCALE 1:12000

MILES

FEET

KILOMETERS

NORTH

QUARTER QUADRANGLE LOCATION

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

CENTRALIA NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 33 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CENTRALIA NE QUADRANGLE
SHEET NUMBER 34 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

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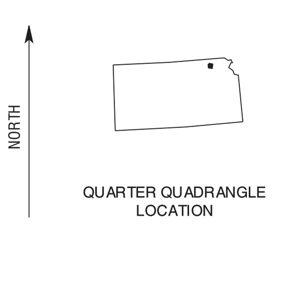
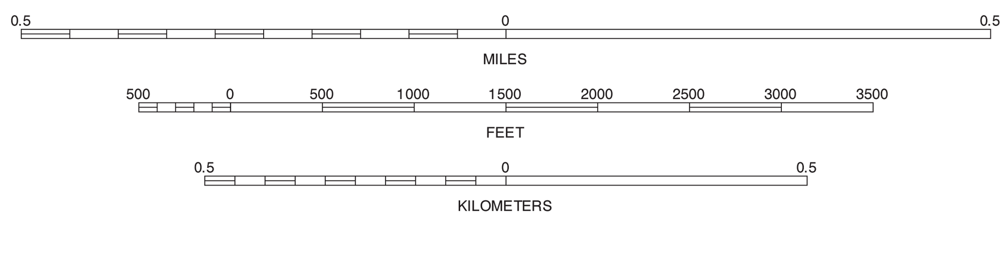


SCALE 1:12000



CENTRALIA NE, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 34 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CORNING NW QUADRANGLE
SHEET NUMBER 35 OF 56

Joins sheet 26, Baileyville SE

Joins sheet 27, Seneca SW

Joins sheet 28, Seneca SE

Joins sheet 34, Centralia NE

Joins sheet 36, Corning NE

Joins sheet 42, Centralia SE

Joins sheet 43, Corning SW

Joins sheet 44, Corning SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

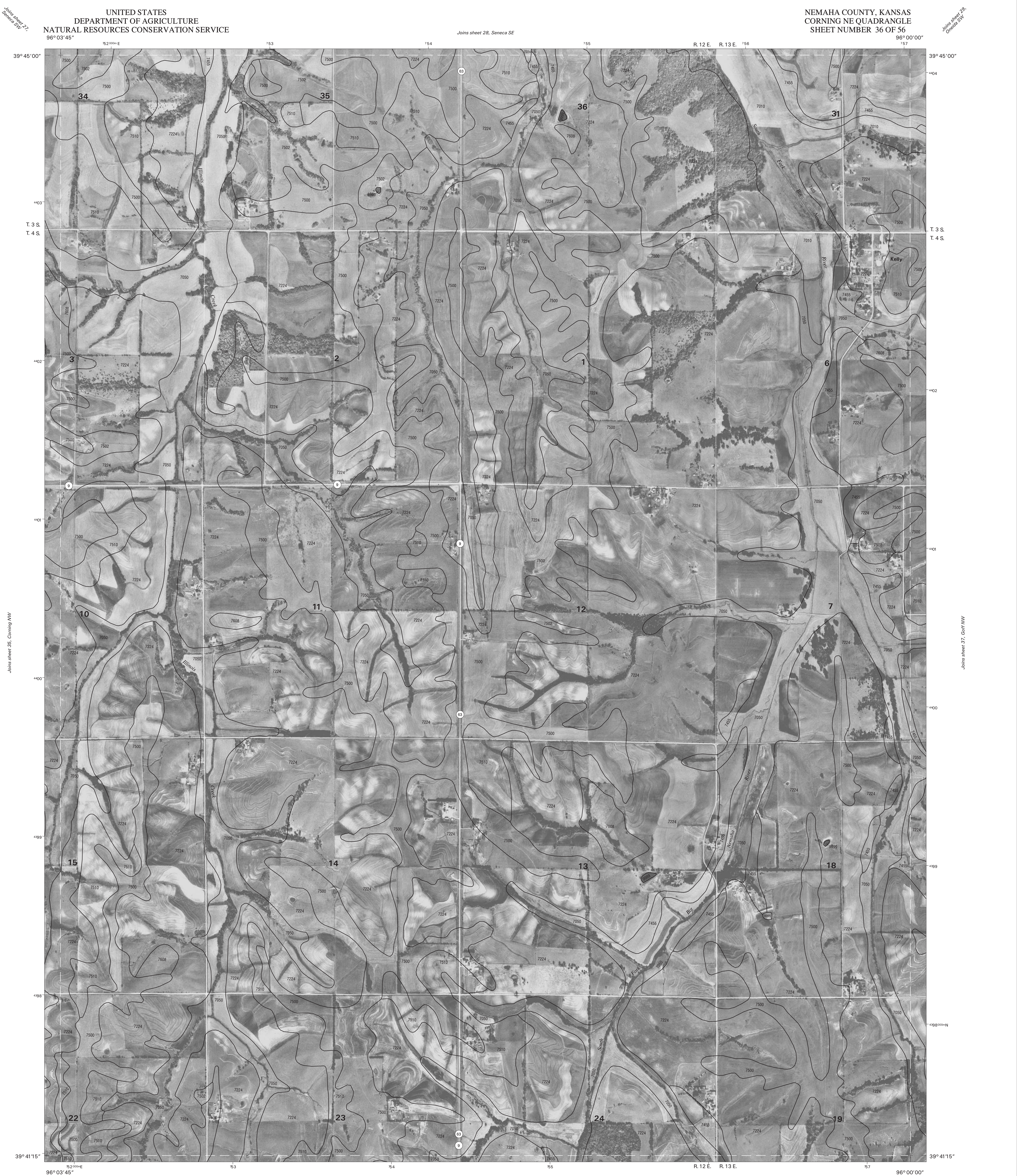
0.5 0 0.5 KILOMETERS

CORNING NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 35 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CORNING NE QUADRANGLE
SHEET NUMBER 36 OF 56



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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

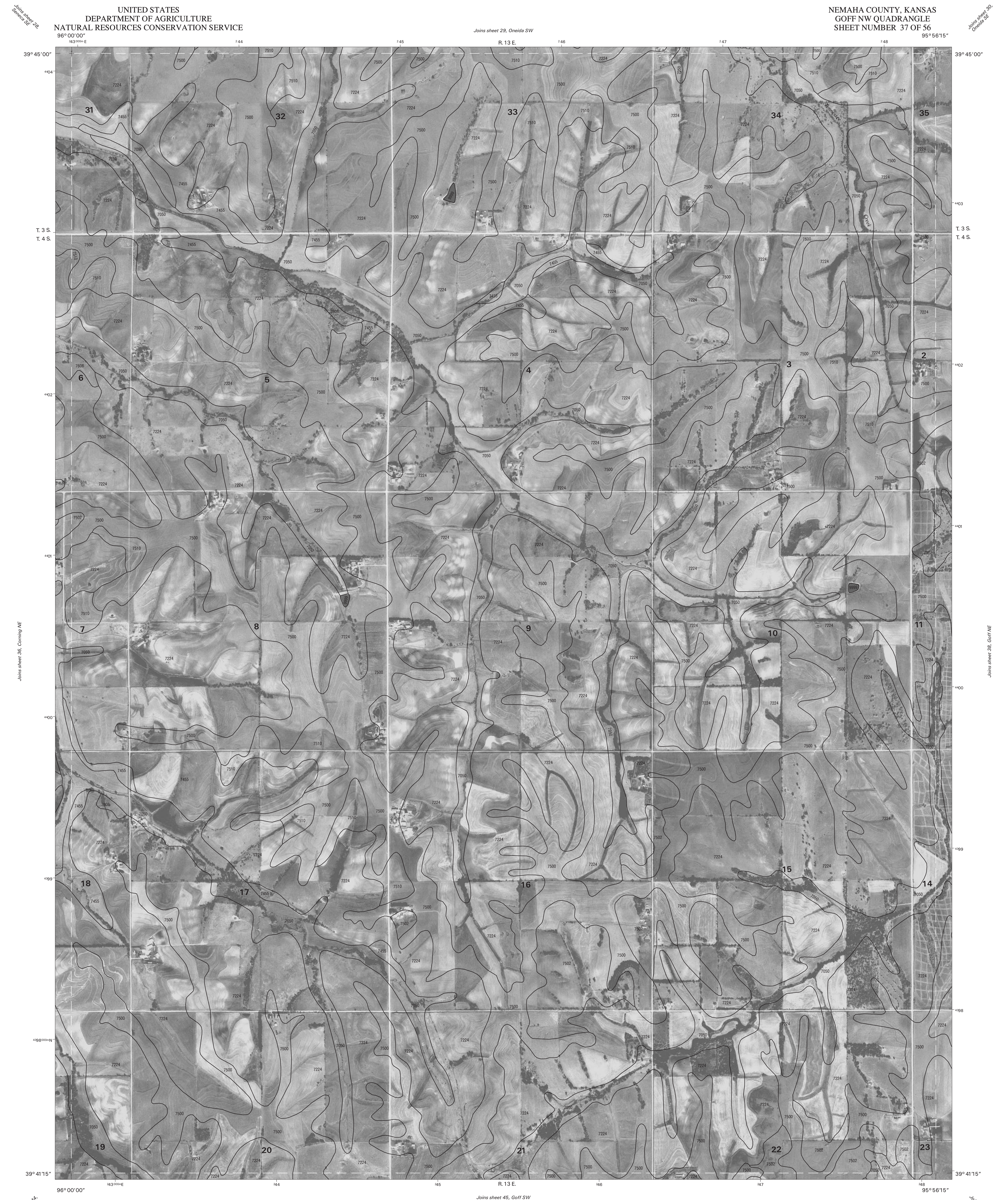
0.5 0 0.5 KILOMETERS

CORNING NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 36 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
GOFF NW QUADRANGLE
SHEET NUMBER 37 OF 56



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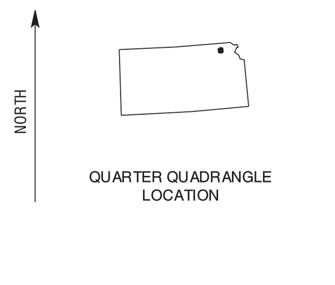
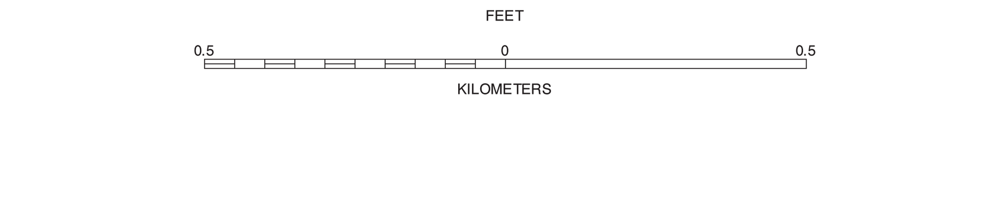
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



SCALE 1:12000



GOFF NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 37 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
GOFF NE QUADRANGLE
SHEET NUMBER 38 OF 56

Joins sheet 28, Oneida SW

Joins sheet 30, Oneida SE

Joins sheet 31, Woodlawn SW

Joins sheet 45, Goff SW

Joins sheet 46, Goff SE

Joins sheet 47, Wetmore SW

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

GOFF NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 38 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

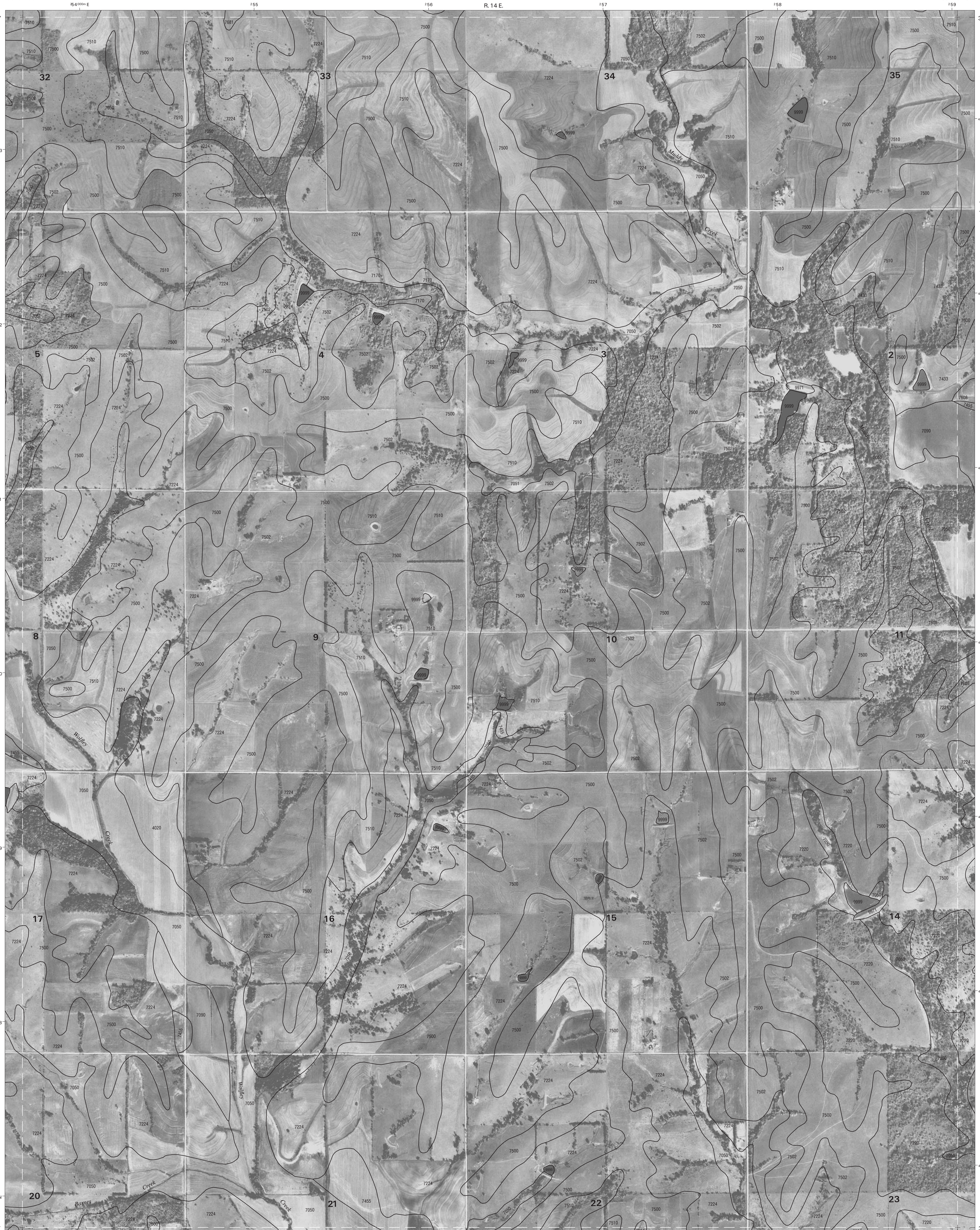
NEMAHA COUNTY, KANSAS
WETMORE NW QUADRANGLE
SHEET NUMBER 39 OF 56

Joins sheet 30, Oneida SE

Joins sheet 31, Woodlawn SW

Joins sheet 32, Woodlawn SE

95° 52′30″ | 39° 45′00″ | 95° 48′45″



Joins sheet 38, Goff NE

Joins sheet 40, Wetmore NE

39° 41′15″ | 95° 52′30″ | 95° 48′45″

Joins sheet 46, Goff SE

Joins sheet 47, Wetmore SW

Joins sheet 48, Wetmore SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

WETMORE NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 39 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WETMORE NE QUADRANGLE
SHEET NUMBER 40 OF 56

Joins sheet 31, Woodlawn SW

Joins sheet 32, Woodlawn SE

Joins sheet 47, Wetmore SW

Joins sheet 48, Wetmore SE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

WETMORE NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 40 OF 56

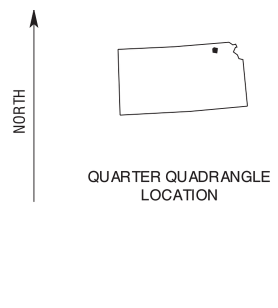
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CENTRALIA SW QUADRANGLE
SHEET NUMBER 41 OF 56

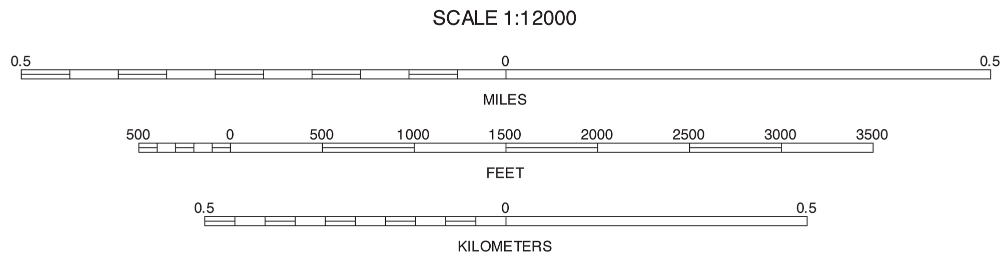
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



CENTRALIA SW, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 41 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

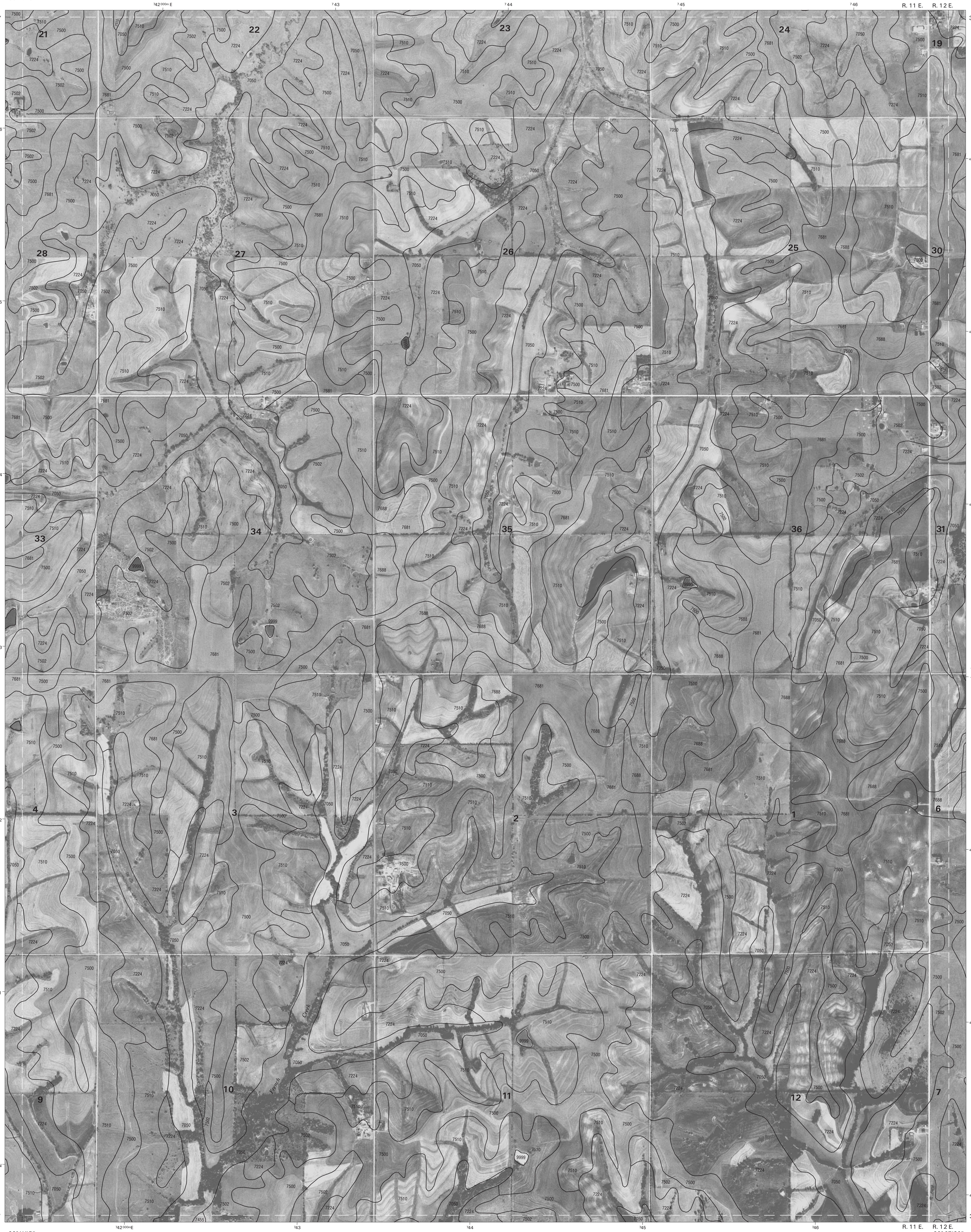
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CENTRALIA SE QUADRANGLE
SHEET NUMBER 42 OF 56

Joins sheet 33, Centralia NW

Joins sheet 34, Centralia NE

Joins sheet 35, Corning NW



Joins sheet 41, Centralia SW

Joins sheet 43, Corning SW

Joins sheet 49, Duluth NW

Joins sheet 50, Duluth NE

Joins sheet 51, Havensville NW

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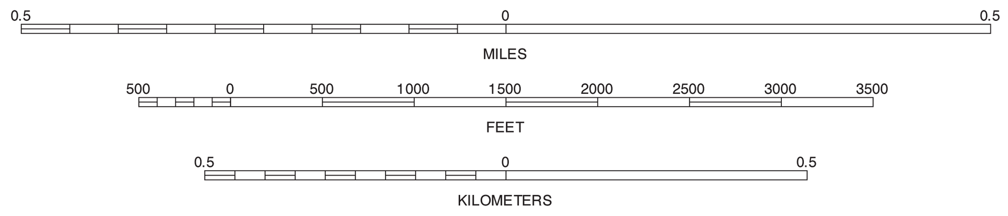
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

SCALE 1:12000



CENTRALIA SE, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 42 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CORNING SW QUADRANGLE
SHEET NUMBER 43 OF 56

Joins sheet 34, Centralia NE

Joins sheet 35, Corning NW

Joins sheet 36, Corning NE

96° 07′30″ | 747000m E | 748 | 749 | R. 12 E. | 750 | 751 | 752 | 96° 03′45″

39° 41′15″

Joins sheet 42, Centralia SE

Joins sheet 44, Corning SE

T. 4 S.
T. 5 S.

4396 | 4395 | 4394 | 4393 | 4392 | 4391000N | 4390000mN

39° 37′30″

96° 07′30″ | 747000m E | 748 | 749 | R. 12 E. | 750 | 751 | 752 | 96° 03′45″

Joins sheet 50, Duluth NE

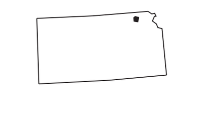
Joins sheet 51, Havensville NW

Joins sheet 52, Havensville NE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 | 0 | 0.5 MILES

500 | 0 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | 3500 FEET

0.5 | 0 | 0.5 KILOMETERS

CORNING SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CORNING SE QUADRANGLE
SHEET NUMBER 44 OF 56

Joins sheet 35, Corning NW

Joins sheet 36, Corning NE

Joins sheet 37, Goff NW

96° 03′ 45″ 96° 00′ 00″

39° 41′ 15″

39° 37′ 30″

96° 03′ 45″ 96° 00′ 00″

Joins sheet 43, Corning SW

Joins sheet 45, Goff SW

Joins sheet 51, Havensville NW

Joins sheet 52, Havensville NE

Joins sheet 53, Soldier NW

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North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

CORNING SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 44 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

GOFF SW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
GOFF SE QUADRANGLE
SHEET NUMBER 46 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

GOFF SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 46 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WETMORE SW QUADRANGLE
SHEET NUMBER 47 OF 56

Joins sheet 38, Goff NE

Joins sheet 39, Wetmore NW

Joins sheet 40, Wetmore NE

95° 52′30″ 95° 48′45″

39° 41′15″

39° 37′30″

95° 52′30″ 95° 48′45″

Joins sheet 46, Goff SE

Joins sheet 48, Wetmore SE

Joins sheet 54, Soldier NE

Joins sheet 55, Circleville NW

Joins sheet 56, Circleville NE

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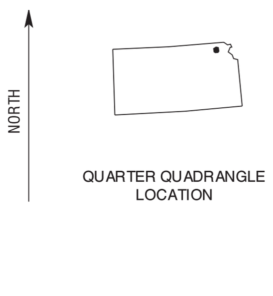
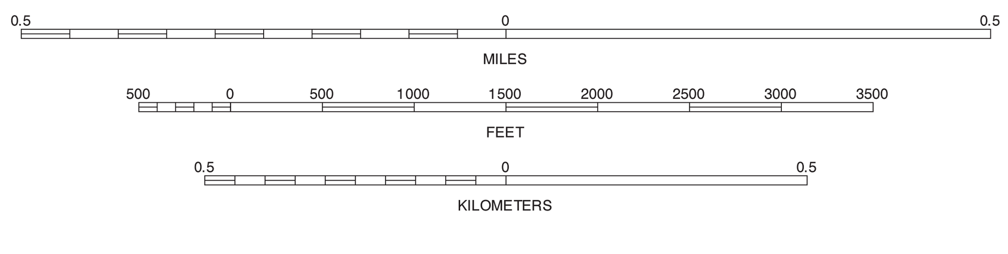
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



WETMORE SW, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 47 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

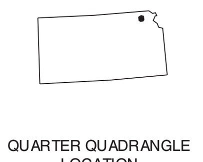
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
WETMORE SE QUADRANGLE
SHEET NUMBER 48 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

WETMORE SE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 48 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
DULUTH NW QUADRANGLE
SHEET NUMBER 49 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

DULUTH NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 49 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
DULUTH NE QUADRANGLE
SHEET NUMBER 50 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

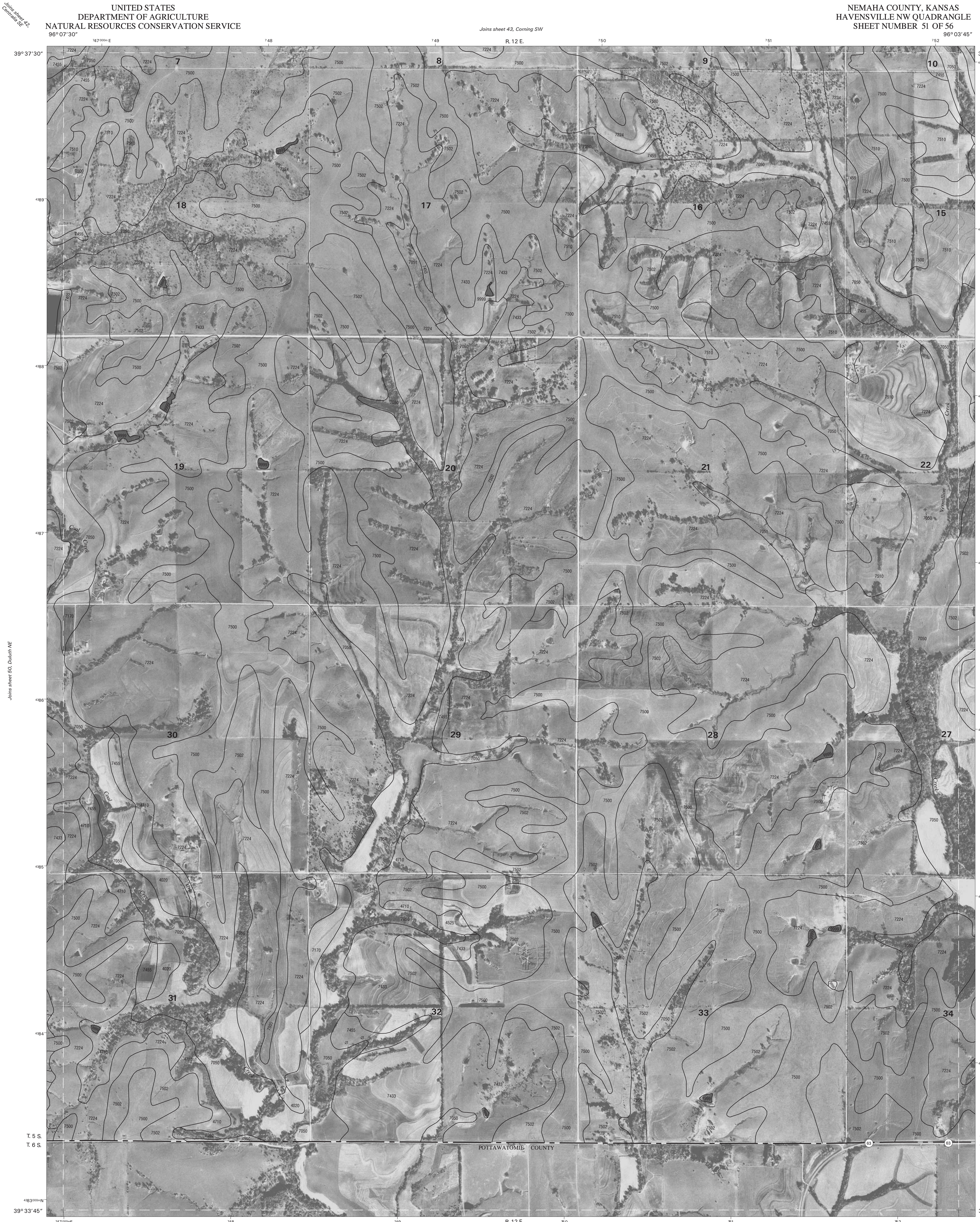
KILOMETERS

DULUTH NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 50 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
HAVENSVILLE NW QUADRANGLE
SHEET NUMBER 51 OF 56



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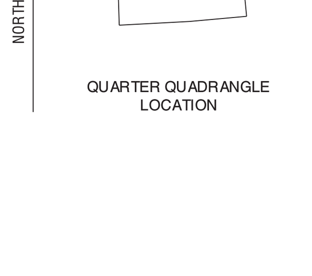
North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

HAVENSVILLE NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 51 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
HAVENSVILLE NE QUADRANGLE
SHEET NUMBER 52 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological Survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

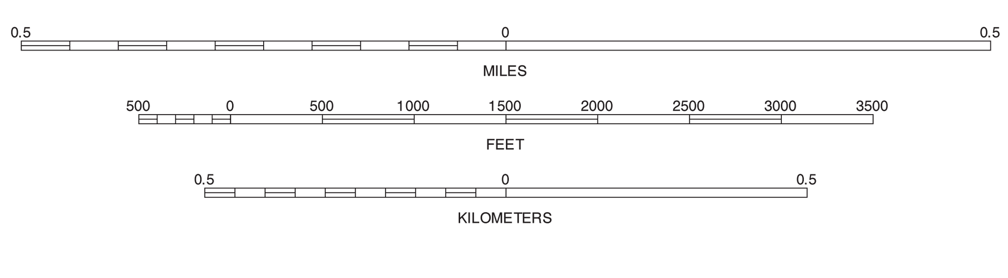
HAVENSVILLE NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 52 OF 56

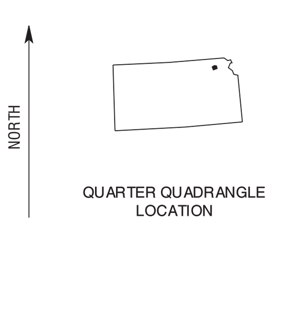
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
SOLDIER NW QUADRANGLE
SHEET NUMBER 53 OF 56

SCALE 1:12000





QUARTER QUADRANGLE LOCATION

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

SOLDIER NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 53 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

Joins sheet 45, Goff SW

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

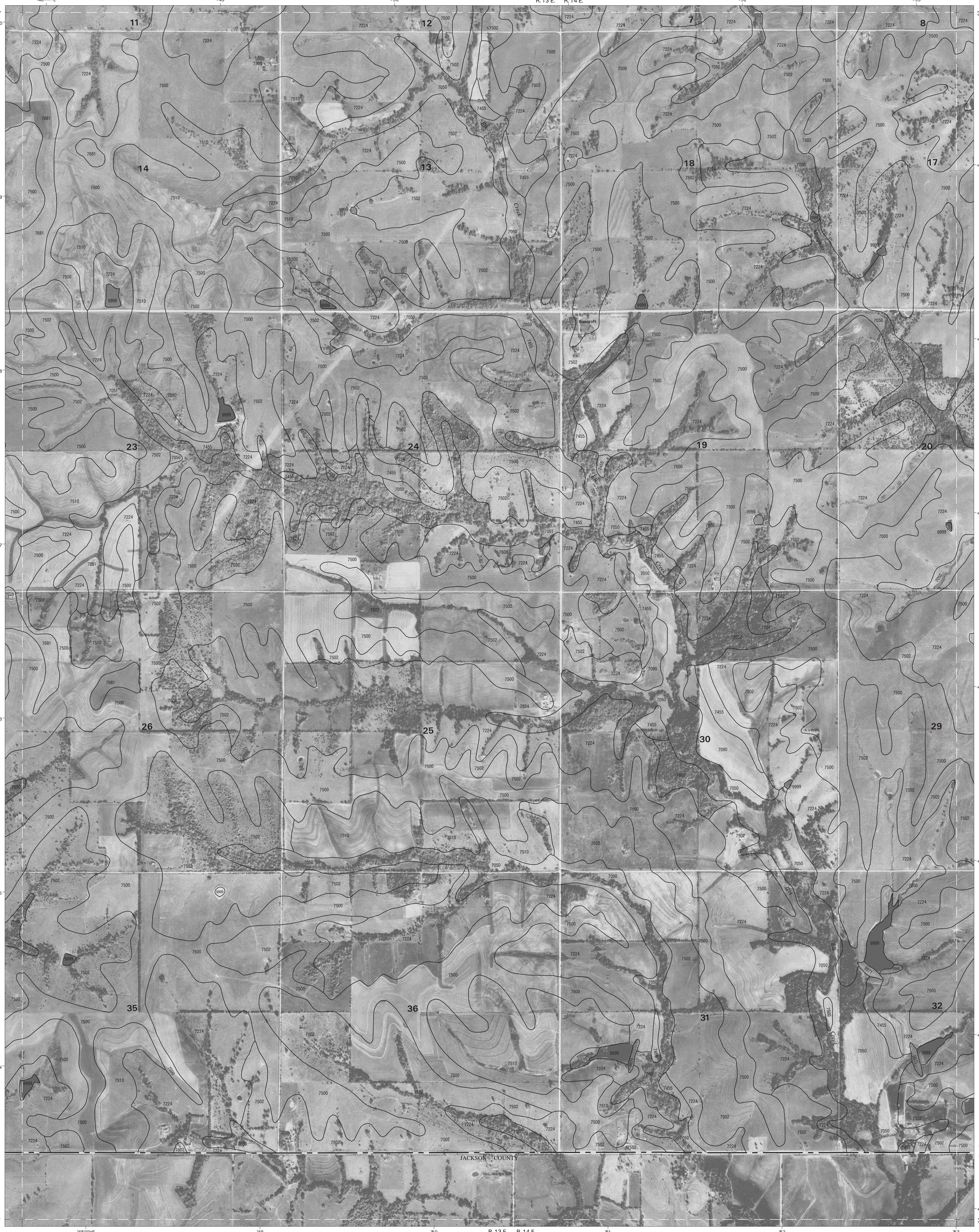
Joins sheet 46, Goff SE

NEMAHA COUNTY, KANSAS
SOLDIER NE QUADRANGLE
SHEET NUMBER 54 OF 56

Joins sheet 47, Wetmore SW

95° 56'15" 95° 52'30"

39° 37'30" 39° 37'30"



Joins sheet 53, Soldier NW

Joins sheet 55, Circleville NW

39° 33'45" 39° 33'45"

95° 56'15" R. 13 E. R. 14 E. 95° 52'30"

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North American Datum of 1983(NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

SOLDIER NE, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 54 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

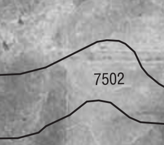
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NEMAHA COUNTY, KANSAS
CIRCLEVILLE NW QUADRANGLE
SHEET NUMBER 55 OF 56

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83), GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

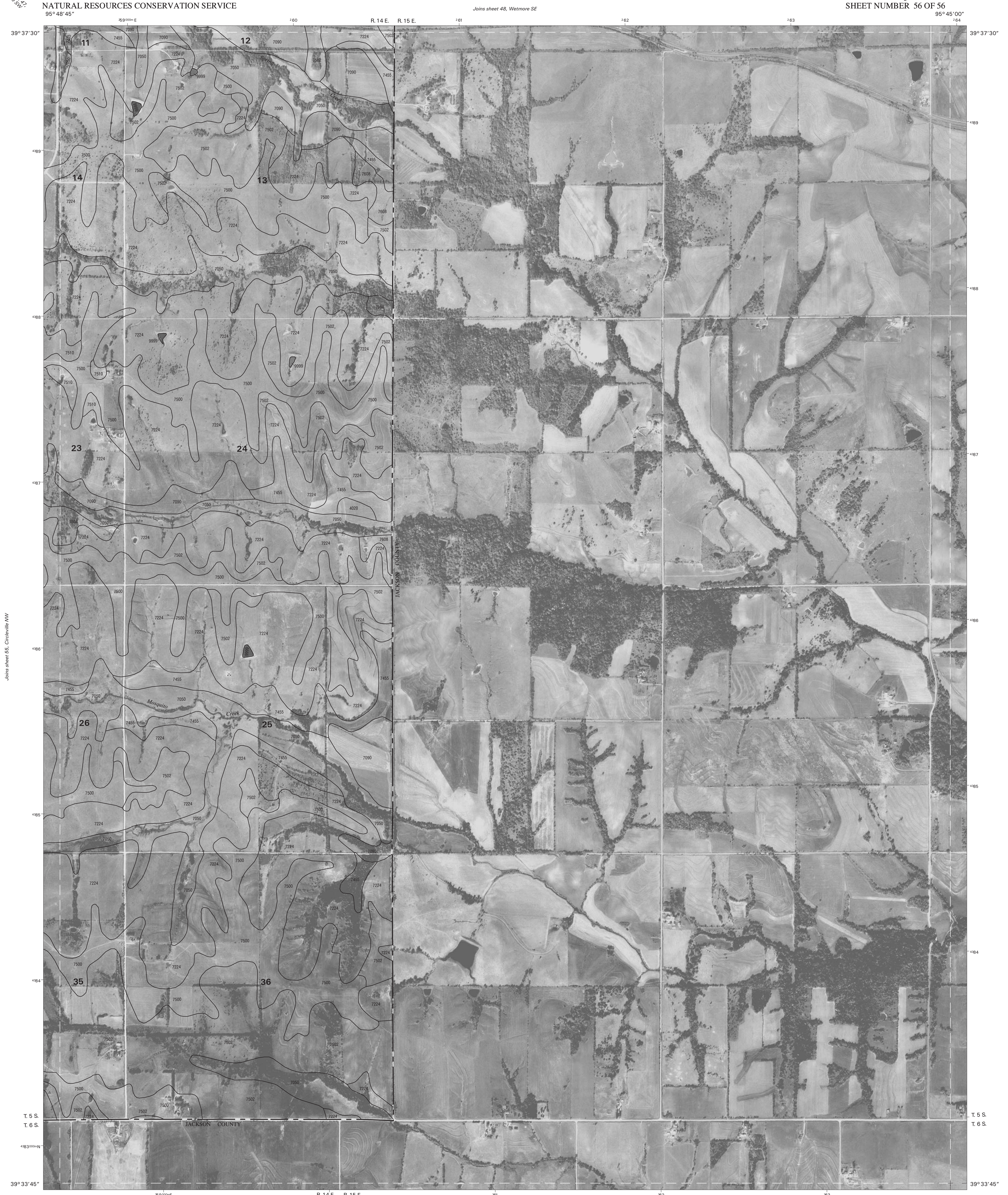
500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

CIRCLEVILLE NW, KANSAS
3.75 MINUTE SERIES
SHEET NUMBER 55 OF 56

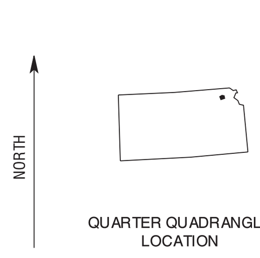
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of Interior, Geological Survey, from 1991 aerial photography. Public land survey system (PLSS) were acquired from U.S. Geological survey.

North American Datum of 1983(NAD83). GRS-80 Spheroid 1000-meter ticks: Universal Transverse Mercator, zone 14. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

CIRCLEVILLE NE, KANSAS

3.75 MINUTE SERIES
SHEET NUMBER 56 OF 56

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.